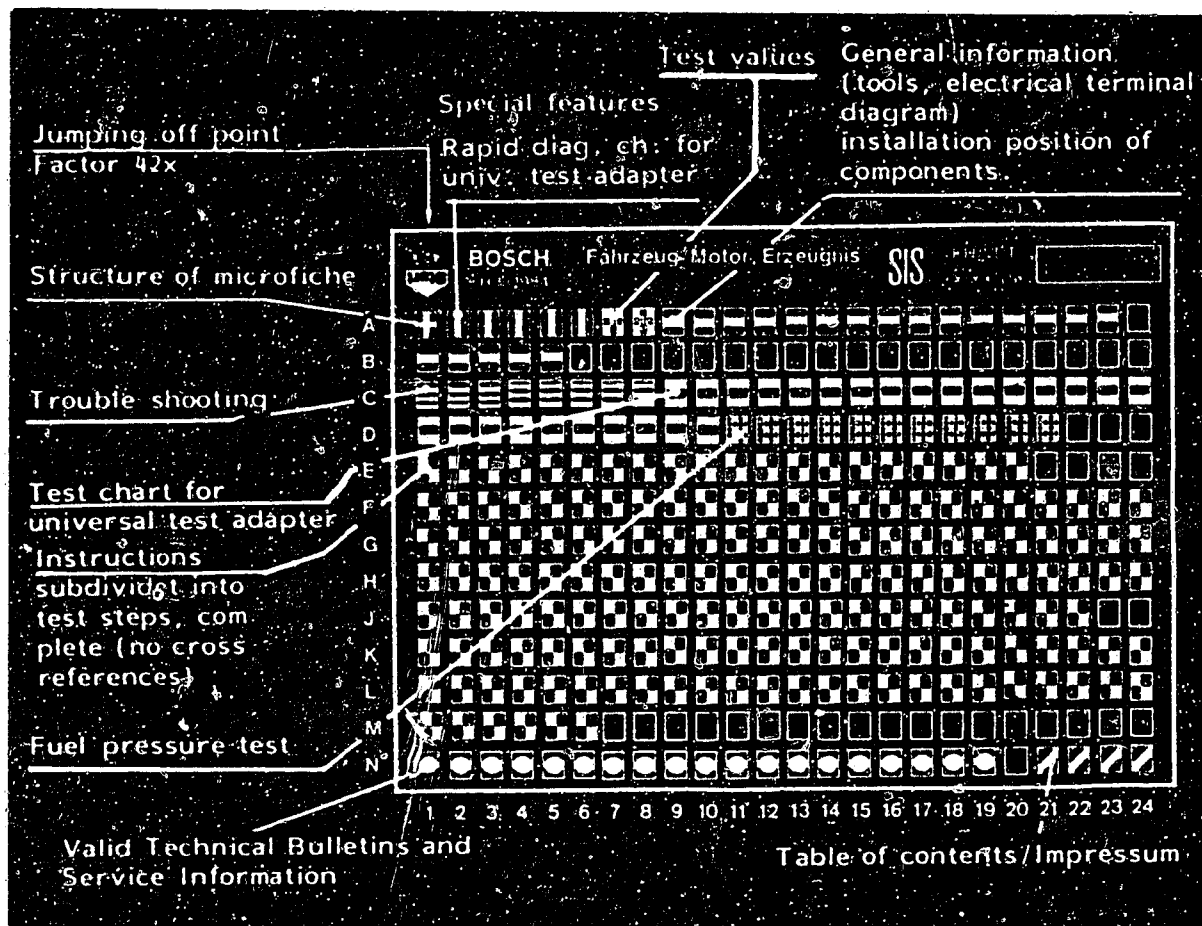


Structure of microfiche

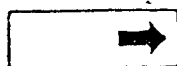


1. Read from left to right
2. Title of microfiche (appears on each coordinate)

E16	Product/component/test step
	Vehicle/engine

Coordinate

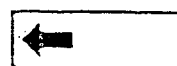
3. Limits of section



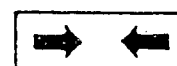
Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C6

A1

Trouble-shooting program



SPECIAL FEATURES

This microfiche card contains the following vehicles:

- 318i, model for Europe (from 9.83), LE 1 -version
- 318i/518i, models for Sweden/Switzerland (from 9.83), LE1-version
- 318i, model for US (from 1.83), LU-version

Special features (all vehicles):

- * O-ring connections for the electric fuel-injection valves and the pressure regulator
- * The fuel filter is in the engine compartment

Special features (models for Sweden/Switzerland):

- * Secondary-air induction
- * Vacuum advance

Special features (model for US):

- * Lambda closed-loop control
- * Idle speed control (non-Bosch product)
- * Pressure sensor (altitude sensor)

RAPID DIAGNOSTIC CHART FOR UNIVERSAL TEST ADAPTER

The rapid diagnostic chart below makes it possible for the experienced L-Jetronic expert to check the electrical portion of the system quickly using the universal test adapter.

The rapid diagnostic chart includes the following information:

- Switch settings on the universal test adapter
- Sequence of test steps
- Notes on operation of the universal test adapter or other components
- Reading on the multimeter
- Reference to the Coordinates of the detailed test and trouble-shooting program in question.

If detailed information and instructions are required, proceed in principle according to the trouble-shooting starting from Coordinates B1/B2.

A2

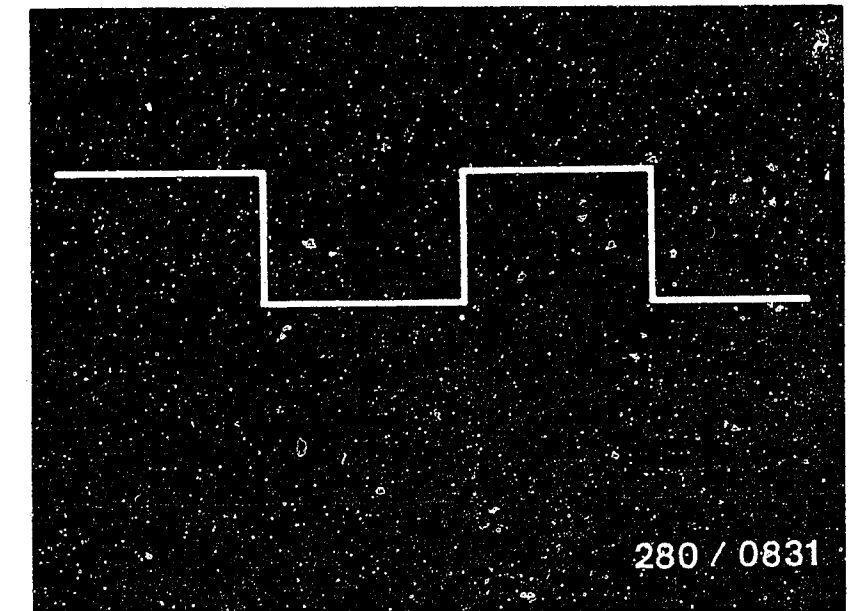
Rapid diag.chart f.universal test adapter

BMW 318i, 518i



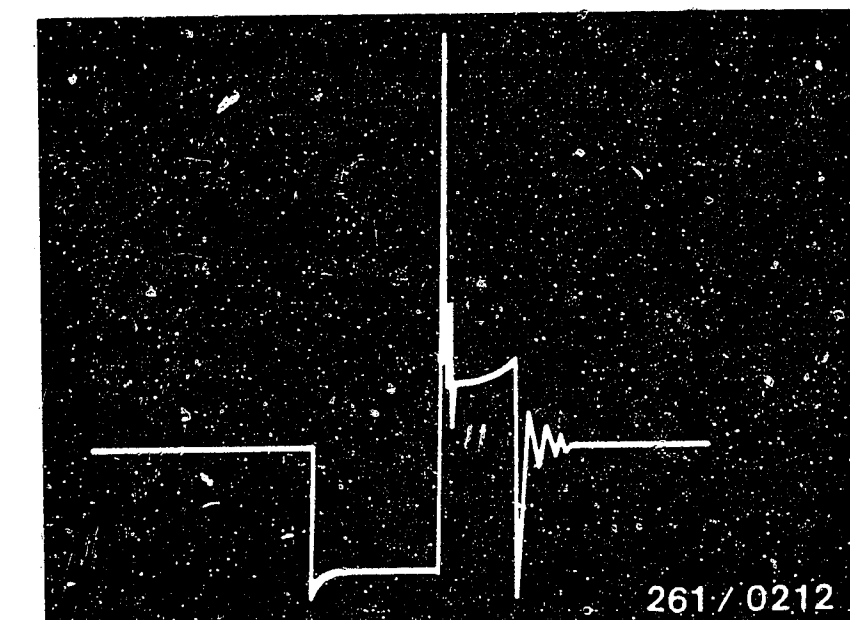
Rapid diagnostic chart for the universal test adapter

Test step	Switch setting		Notes	Test specification (Reading)	for Trouble-shooting, see Coordinates
	V	Ω			
1	5	-	Shift into neutral and start the engine. Europe, Sweden, Switzerland: TD-signal on the ignition trigger box Term. No. 4 on the control unit plug Term. 1 to Term. 5 USA: Term. 1 on the ignition trigger box Term. No. 16 on the control unit plug Term. 1 to Term. 5	Eur.Swed.Switz.: see Figure at top USA: see Figure at bottom	C 11
2	6	-	Shift into neutral and start engine. Voltage from control relay Term.87 on the control unit plug Term. 9 to Term. 5	8 ... 15 V	C 13
3	7	-	Shift into neutral and start engine. Voltage from starting motor Term.50 on the control unit plug Term. 4 to Term. 5.	8 ... 15 V	C 15
4	8	-	Shift into neutral and start engine. Only 318i model for the US: Voltage from the pressure sensor on the control unit plug Term. 11 to Term. 5	Dependent on elevation elevation:300 m: 2 ... 4 V elevation:4000 m: 8 ... 12 V	C 17
5	↓	11	Resistance of the temperature sensor NTC I on the control unit plug Term. 8 to Term. 5	100 ... 200 Ω	C 19



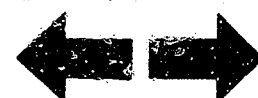
TD-signal (models for Europe, Sweden, and Switzerland)

Primary signal (model for US)



A3

Rapid diag.chart f.universal test adapter
BMW 318i, 518i



A4

Rapid diag.chart f.universal test adapter
BMW 318i, 518i



Rapid diagnostic chart for the universal test adapter (continued)

<u>Test step</u>	<u>Switch setting</u>		<u>Measurement</u>	<u>Notes</u>	<u>Test specification</u> (Reading)	<u>for trouble-shooting, see</u> <u>Coordinates</u>
	V	Ω				
6	↓	12	Resistance of the air-flow sensor potentiometer on the control unit plug Term.7 to Term. 5	Deflect air-flow sensor flap as far as the stop	<u>60 ... 1000 Ω</u>	C 21
7	↓	13	Resistance of the temperature sensor NTC II (engine temperature) on the control unit plug Term. 10 to Term. 5	---	(+15°C...+30°C): <u>1.3...3.6 kΩ</u> +80°C: <u>250...390 Ω</u>	C 23
8	↓	14	Resistance ground-output stage on the control unit plug Term. 13 to Term. 5	---	<u>0 ... 10 Ω</u>	D 1
9	↓	16	Resistance of the idle contact in the throttle valve switch, on control unit plug Term. 2 to Term. 9	Accelerator pedal in at rest position	<u>0 ... 10 Ω</u>	D 3
10	↓	17	Resistance of the full-load contact in the throttle valve switch, on the control unit plug Term. 3 to Term. 9	Step all the way down on the accelerator pedal (full-load setting)	<u>0 ... 10 Ω</u>	D 5
11	↓	18	Resistance of all 4 electric fuel-injection valves connected in parallel, on the control unit plug Term. 12 to Term. 9	---	(+15°C...+30°C) .. 150 209/211 <u>7.0...9.5 Ω</u> .. 150 703/704 <u>6.8...9.3 Ω</u> +80°C: .. 150 209/211 <u>7.2...10.0 Ω</u> .. 150 703/704 <u>7.0...9.8 Ω</u>	D 7

A5

Rapid diag.chart f.universal test adapter
BMW 318i 518i



A6

Rapid diag.chart f.universal test adapter
BMW 318i 518i



TEST SPECIFICATIONS

Pressure regulator

- Fuel pressure, model for EU/S/CH: 2.3...2.7 bar
- Fuel pressure, model for US: 2.8...3.2 bar

Electric fuel pump

- Fuel delivery (measured in the return): min. 650 cm³/30 s
- Voltage at connection (under load): min. 12 V

Thermotime switch (35°/8s):

● Internal electrical resistance at	Between Term. "G" and ground	Between Term. "W" and ground	Between "G" and "W"
Ambient temperature (less than +30°C)	25...40 Ω	0 Ω	25...40 Ω
engine at normal operating temperature (above +40°C)	50...80 Ω	100...160 Ω	50...80 Ω

Electric starting valve

- internal electrical resistance: 3.5...4.5 Ω
- leakage: max. allowable 1 drop/min.

Auxiliary-air device

- internal electrical resistance: 30...65 Ω

Temperature sensor II (engine)

- internal electrical resistance at ambient temperature (+15°...+30°C): 1.3...3.6 kΩ
- engine at normal operating temperature (approx. +80°C): 250...390 Ω

Electric fuel-injection valve (at +20°C)

- internal electrical resistance (0 280 150 209/211): 15.0...17.5 Ω
- internal electrical resistance (0 280 150 703/704): 14.5...17.0 Ω



Air-flow sensor

- Resistance between

Term. 8 and Term. 5:	340...450 Ω
Term. 7 and Term. 5 (deflect air-flow flap all the way)	60...1000 Ω
Term. 9 and Term. 5:	500...760 Ω
Term. 8 and Term. 9:	160...300 Ω

Pressure sensor (Altitude sensor)

elevation 300 m (977 mbar):	2.0... 4.0 V
elevation 4000 m (616 mbar):	8.0...12.0 V
Resistance between Term. 2 (-) and Term. 3 (+):	2.3...2.5 k Ω

Idle adjustment (engine at normal operating temperature, approx. +80°C)

Manual and automatic transmissions:	800...900 min ⁻¹
Model for US:	700...800 min ⁻¹

CO-adjustment

- Model for Europe less than 1.0 vol. % CO
 - Model for Sweden/Switzerland, test specification (with exhaust gas recirculation connected):
Setting (hose disconnected and plugged):
0.2...0.4 vol%CO
0.3...1.0 vol%CO
 - Model for US (Lambda closed-loop control) closed-loop control operation (sensor connected):
Reading for voltage fluctuates between two values
- Open-loop operation (sensor lead taken apart):
The reading for voltage must be equal to the average of the fluctuations.

Rich value (take sensor lead apart and connect to ground on the control unit end):

9...11 V

Lean value (apply 2 V to the sensor lead on the control unit end):

approx. 0.5 V

Switch the exhaust gas recirculation system off for the duration of the exhaust gas measurement and adjustment.

For settings for ignition, valve clearance, and other engine data, see the Equipment a.Auto Data Microfiche.



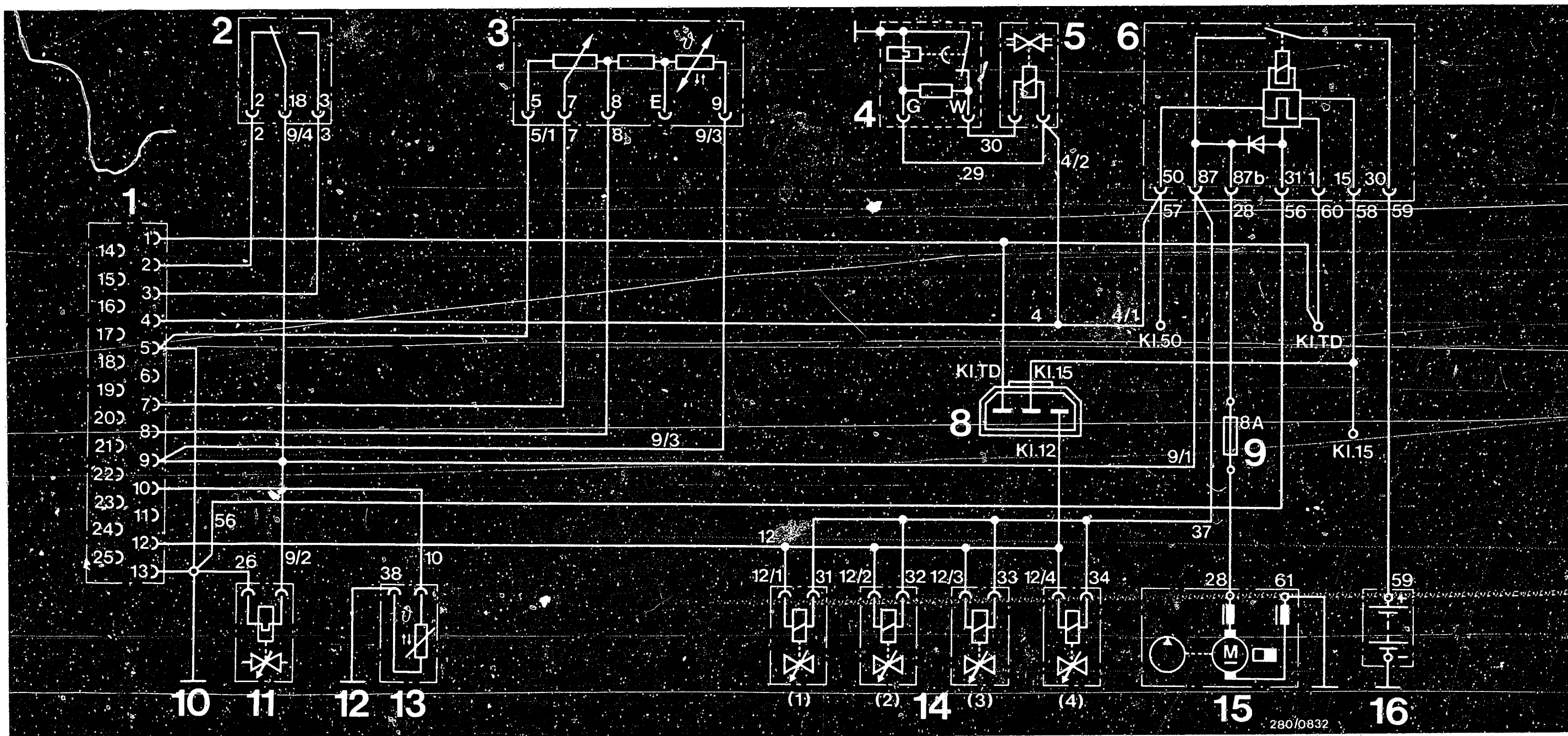


DIAGRAM OF ELECTRICAL CONNECTIONS

BMW 318i, Europe/Sweden/Switzerland

- | | | | |
|---------------------------|--|---|--------------------------------|
| 1 = Control unit plug | 5 = Electric starting valve | 9 = Pump fuse | 13 = Temperature sensor II |
| 2 = Throttle valve switch | 6 = Control relay | 10 = Ground terminal, output stage | 14 = Electric fuel-inj. valves |
| 3 = Air-flow sensor | 8 = Connection for fuel-inj. and on-board computer | 11 = Auxiliary-air device | 15 = Electric fuel pump |
| 4 = Thermotime switch | | 12 = Ground terminal, electronic system | 16 = Battery |
| | | | KI.= Term. |

A9

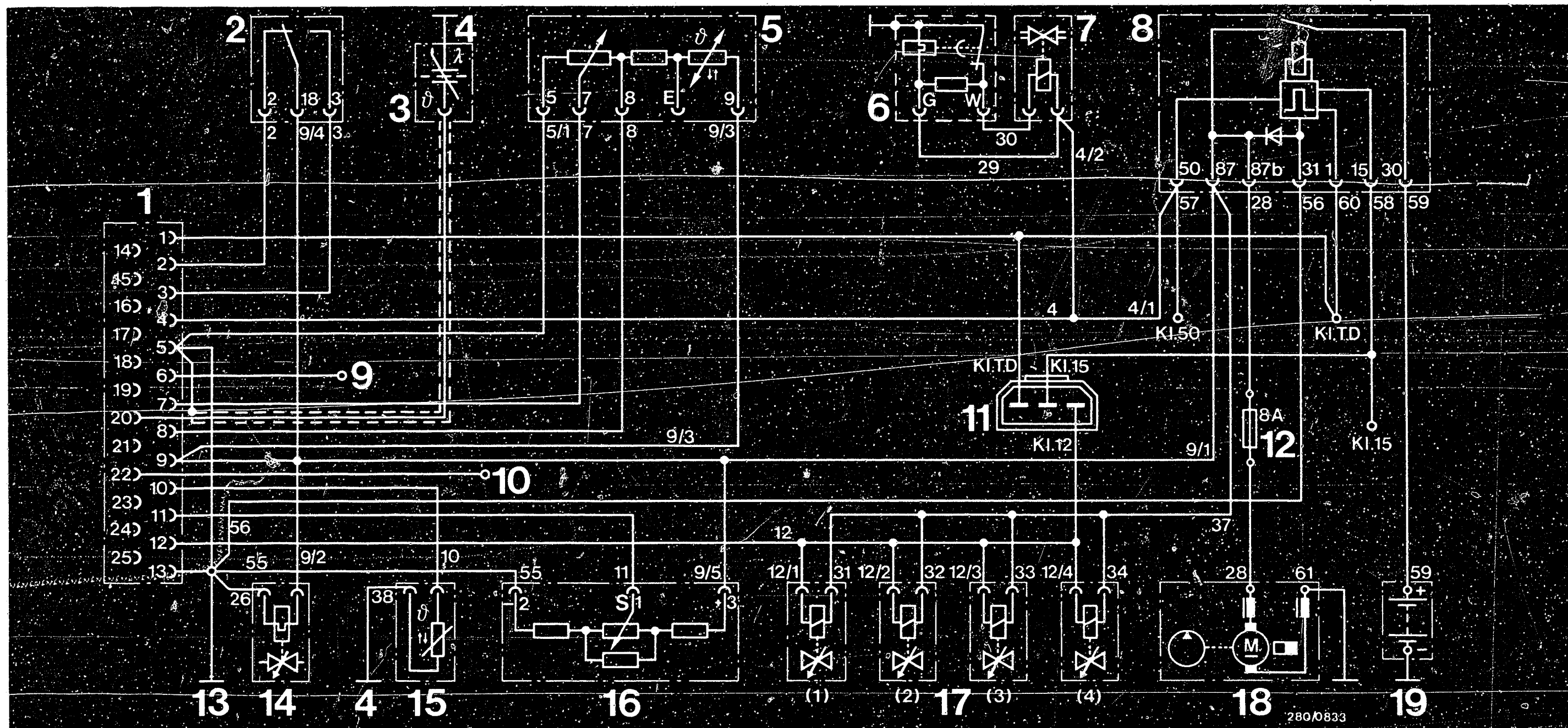
Diagram of electrical connections
BMW 318i, 518i



A10

Diagram of electrical connection
BMW 318i, 518i





280/0833

Diagram of electrical connections BMW 318i, / 518i US/Japan

- | | | | |
|--|---|--|-------------------------------------|
| 1 = Control unit plug | 7 = Electric starting valve | 11 = Connection for fuel-injection and on-board computer | 15 = Temperature sensor II |
| 2 = Throttle valve switch | 8 = Control relay | 12 = Pump fuse | 16 = Pressure sensor |
| 3 = Lambda sensor | 9 = Load signal to the anti-knock relay | 13 = Ground terminal, output stage | 17 = Electric fuel-injection valves |
| 4 = Ground terminal, electronic system | 10 = Integrator outlet diagnosis socket pin 5 | 14 = Auxiliary-air device | 18 = Electric fuel pump |
| 5 = Air-flow sensor | | | 19 = Battery |
| 6 = Thermotime switch | | | KI.= Term. |

A11

Diagram of electrical connections
BMW 318i, 518i



A12

Diagram of electrical connections
BMW 318i, 518i



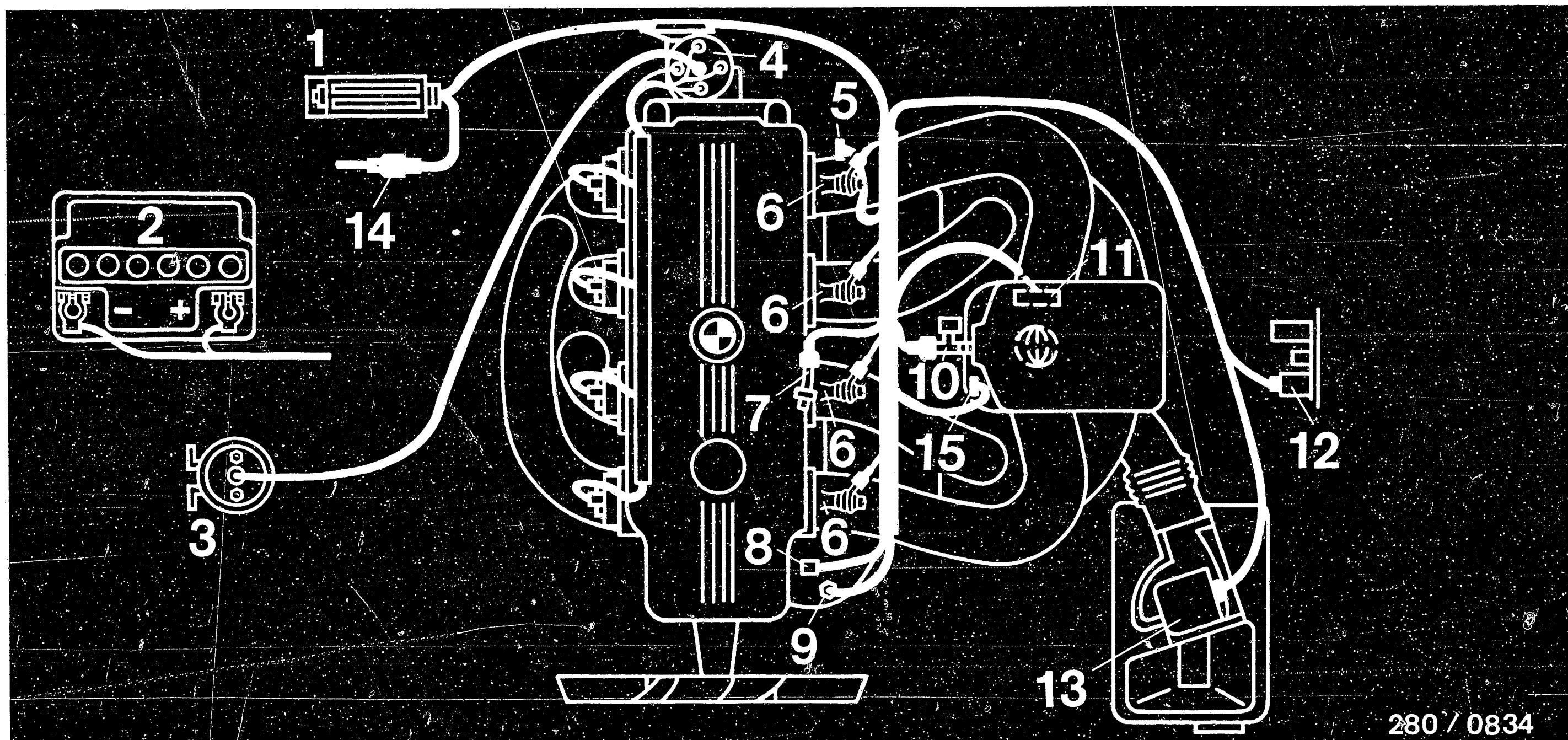


DIAGRAM OF ELECTRICAL LEADS, BMW 318i, MODEL FOR EUROPE (Models for Sweden/Switzerland/US similar)

- | | | | |
|--------------------------|------------------------------------|------------------------------|---|
| 1 = Control unit plug | 5 = Ground terminal, output stage | 9 = Thermotime switch | 13 = Air-flow sensor |
| 2 = Battery | 6 = Electric fuel-injection valves | 10 = Electric starting valve | 14 = Plug connection for Term.TD |
| 3 = Ignition coil | 7 = Auxiliary-air device | 11 = Throttle valve switch | Term.15, Term.12 control unit |
| 4 = Ignition distributor | 8 = Temperature sensor II | 12 = Control relay | 15 = Ground terminal, electronic system |

A13

Diagram of electrical leads
BMW 318i, 518i



A14

Diagram of electrical leads
BMW 318i, 518i



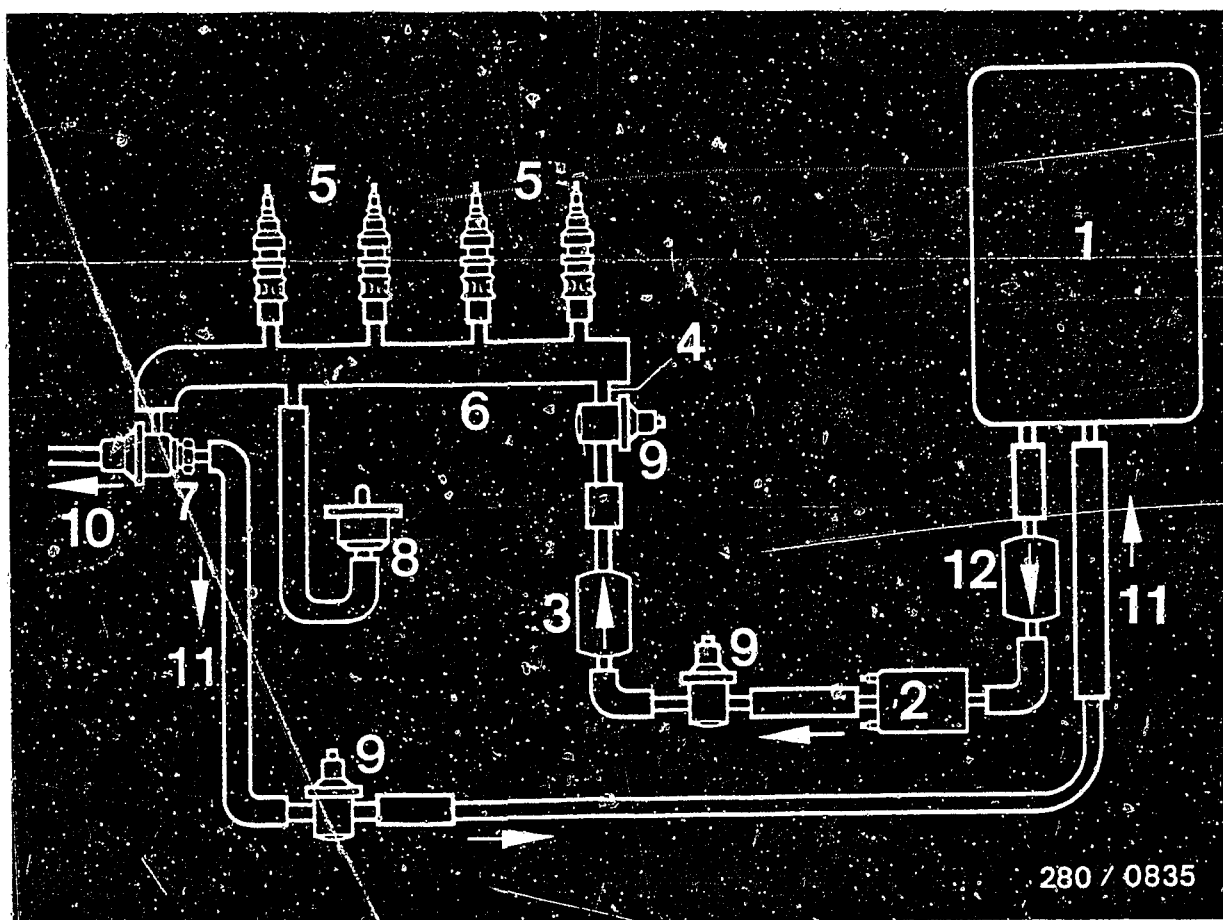
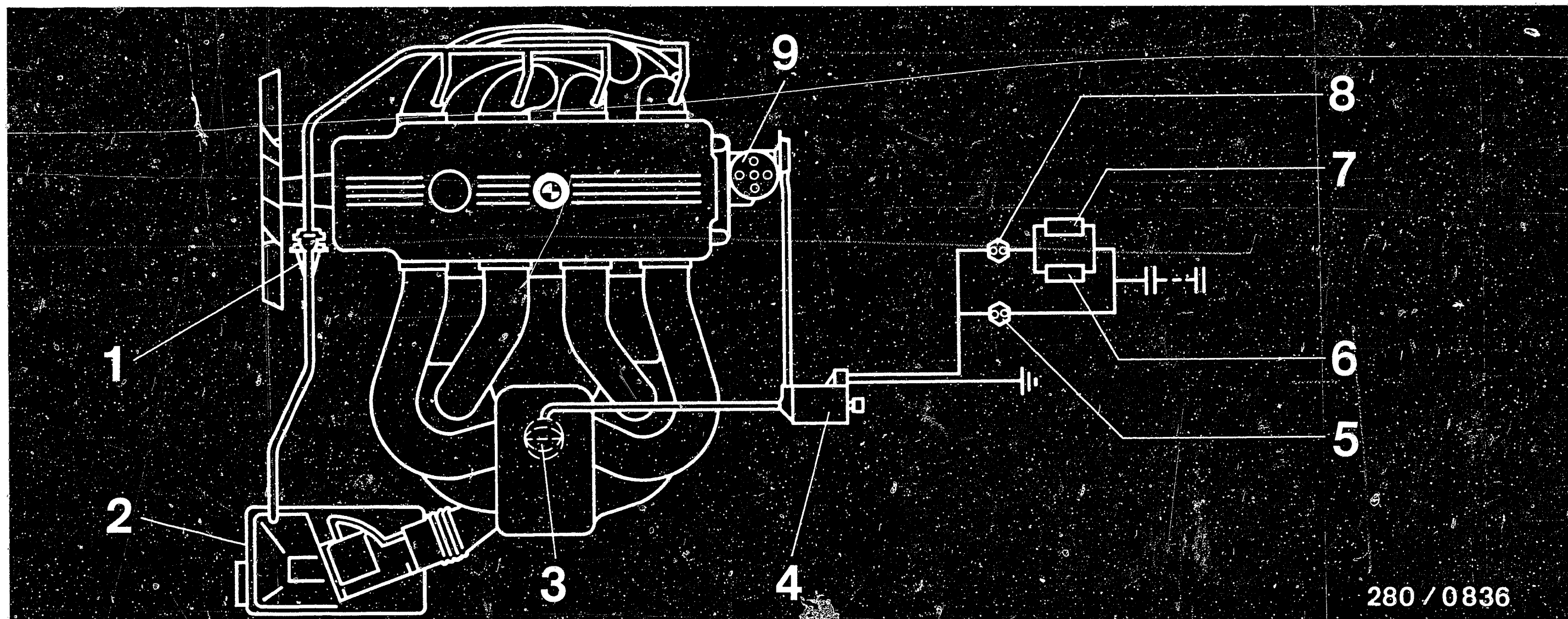


DIAGRAM OF FUEL LINES

- 1 = Fuel tank
- 2 = Electric fuel pump
- 3 = Fuel filter
- 4 = Fuel delivery line
- 5 = Electric fuel-injection valves
- 6 = Fuel distribution pipe
- 7 = Pressure regulator
- 8 = Electric starting valve
- 9 = Fuel-line pressure damper
- 10 = Connection to the intake manifold
- 11 = Fuel return line
- 12 = Fuel spinner



280 / 0836

1 = natural aspiration air valves
2 = Air filter
3 = Throttle valve

4 = Solenoid-operated valve
5 = Temperature switch +17°C
6 = 4th/5th gear switch (not
used for automatic transmissions)

7 = 65 km/hour switch
8 = Temperature switch +55°C
9 = Ignition distributor

Only for models for Sweden/Switzerland:

OPERATION OF THE SECONDARY AIR INDUCTION AND VACUUM ADVANCE

- The air valves supply fresh air to the exhaust gas in the exhaust manifold in order to reduce the values for CO and hydrocarbons to the allowable levels by means of afterburning. For this, the vacuum after the exhaust valves, which has a periodic effect, is used for the operation of the air valves. Using this vacuum, the air valves on their own draw filtered intake air into the exhaust manifold and thus contribute to a reduction in the toxic constituents.
- The vacuum advance on the ignition distributor is activated by means of the electric switchover valve. The conditions for this are a coolant temperature of above + 55°C, the vehicle in 4th/5th gear (for manual transmissions), and a velocity greater than 65 km per hour.

A16

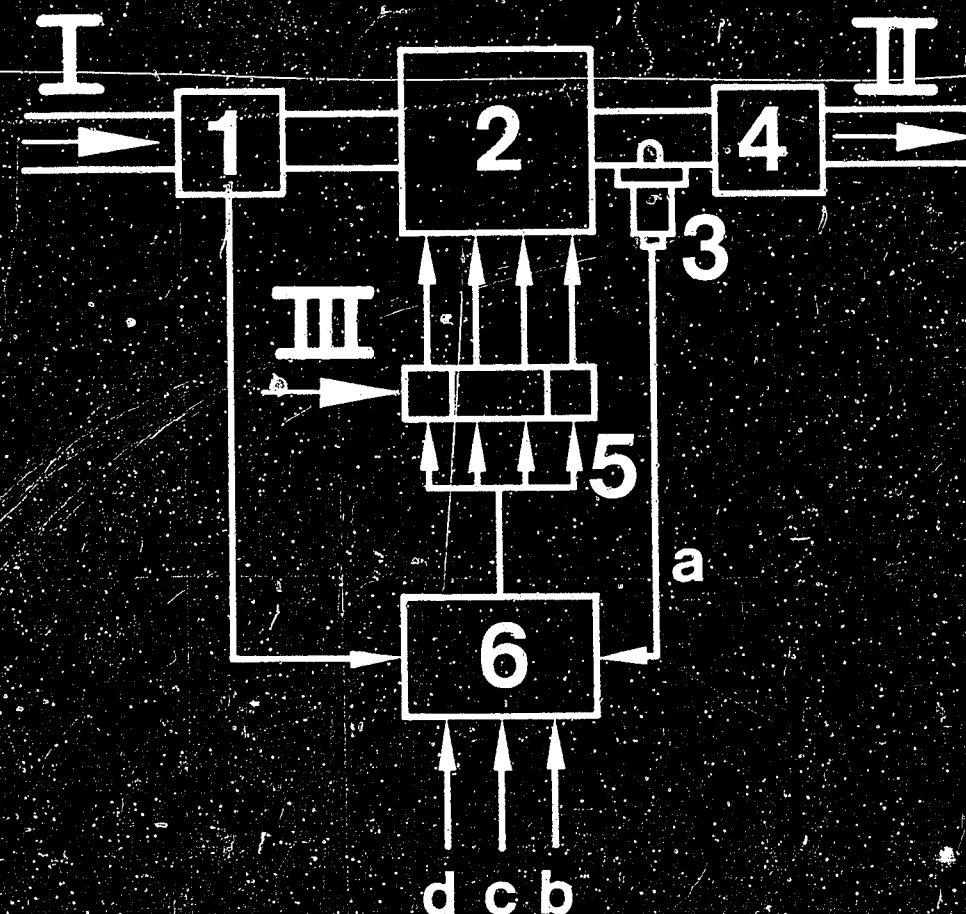
Secondary air induction/timing advance
BMW 318i, 518i



A17

Secondary air induction/timing advance
BMW 318i, 518i





280 / 0837

1 = Air-flow sensor
2 = Engine
3 = Lambda sensor
4 = 3-bed catalytic converter

5 = Electric fuel-injection valves
6 = LU control unit with Lambda closed-loop control

a = Sensor voltage
b = Supply voltage
c = Engine speed
d = Engine temperature

I = Air
II = Exhaust gas
III = Fuel

For US model only: FUNCTION OF THE LAMBDA CLOSED-LOOP CONTROL

With the control circuit that is closed using a special measuring sensor - the lambda sensor - deviations from a given air/fuel ratio can be identified and corrected. The control principle is based on the fact that the oxygen level remaining in the exhaust gas is continually measured by the lambda sensor. This level is an indicator for the composition of the air/fuel mixture supplied to the engine. As a measuring sensor in the exhaust pipe, the lambda sensor provides information as to whether the mixture is richer or leaner than $\lambda = 1$. The lambda sensor reports this deviation to the control unit and the lambda closed-loop control (in the control unit) acts upon the fuel-injection duration and/or the amount of fuel injected as pre-calculated by the fuel-injection control. This regulating to $\lambda = 1$ is a prerequisite if the subsequent 3-bed catalytic converter is to make it possible to burn the toxic substances with a good efficiency.

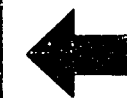
A18

Lambda closed-loop control
BMW 318i, 518i



A19

Lambda closed-loop control
BMW 418i, 518i



TEST EQUIPMENT AND TOOLS

Name	Designation	Part No.
Universal test adapter Adapter lead	ETT 018.01	0 684 101 801 1 684 463 123
Motor tester	e.g. MOT 002.00 MOT 300 MOT 400	0 684 000 200 0 684 000 300 0 684 000 400
Exhaust gas analyzer, calibrated infrared exhaust gas analyzer	e.g. ETT 008.00 ETT 008.04 or ETT 008.05	0 684 100 800 0 684 100 804 0 684 100 805
Lambda closed-loop control tester	KDJE-P-600	
Pressure gauge	Quality class 1.0 = 6 bar Graduation 0.1 bar	1 687 231 154
Three-way line		KDJE P-100/13
Test lead		1 684 463 093
Pressure tester or Pressure tester (no longer avail.)		KDJE-P 100 KDEP 1034
Set of parts for electric fuel-inj. valve and pressure regulator		1 287 010 704
Electric tester or multimeter	e.g. ETE 014.00 e.g. Philips PM 2517 X e.g. Misco Master 50 K e.g. Chinaglia Cortina	0 684 101 400
Hex screwdriver AF5	commerc. avail.	e.g. Hahn&Kolb No. 52138

A20

Test equipment and tools

BMW 318i, 518i

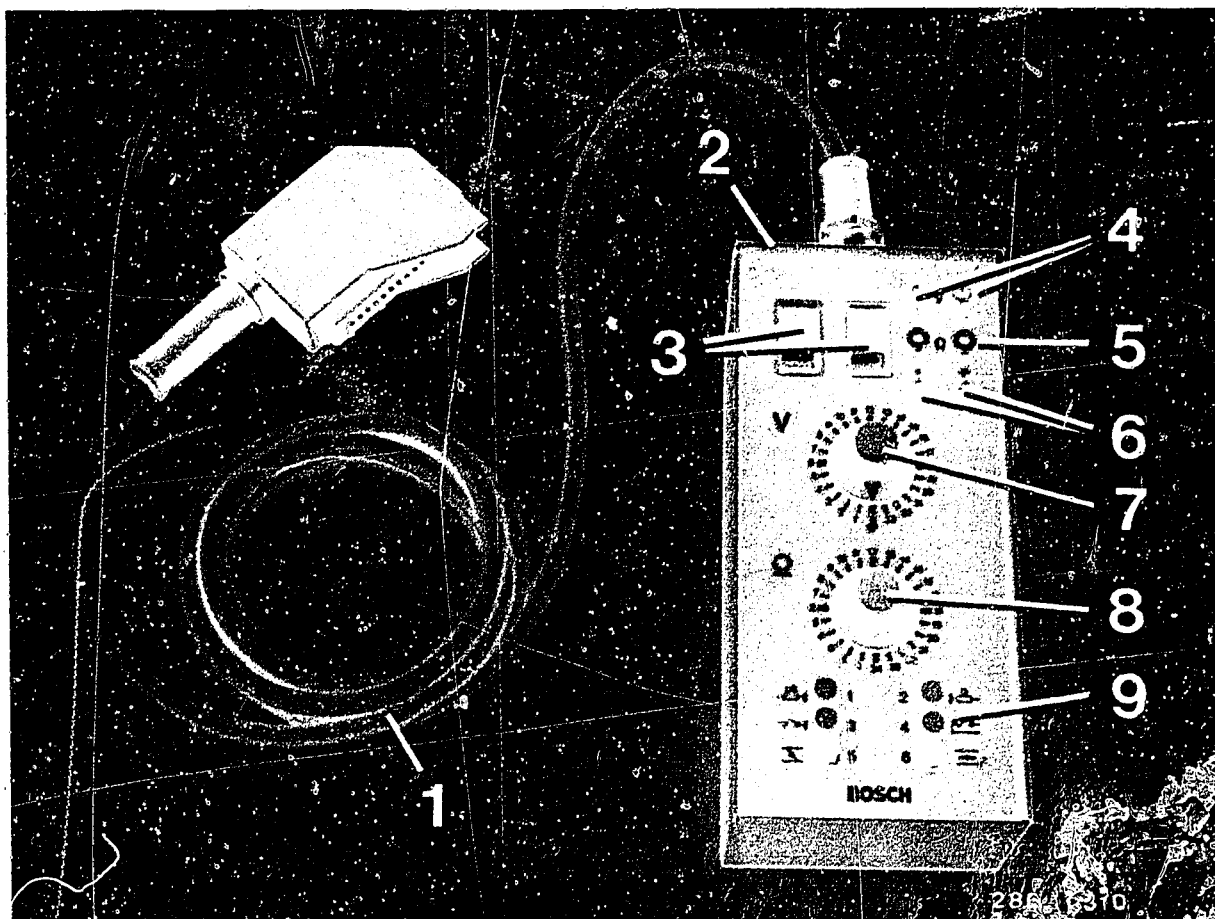


Test equipment and tools (continued)

Name	Designation	Part No.
Electric fuel-injection valve	(Europe, Sweden, Switzerland)	0 280 150 209/704
	US model 83	0 280 150 211
	US model 85	0 280 150 703
Silicone grease for electric fuel-injection valves	Ft 2 v 1	5 700 080 125
Lambda sensor mounting paste	VS 140 16 Ft	5 964 080 105
Vacuum hand pump (Mityvac pump)	Korinth Ludwig-Kloos-str. 21 6450 Hanau 7 (Steinheim)	

Use suitable, commercially-available tools to take off and press on the idle CO anti-tamper device for the air-flow sensor.

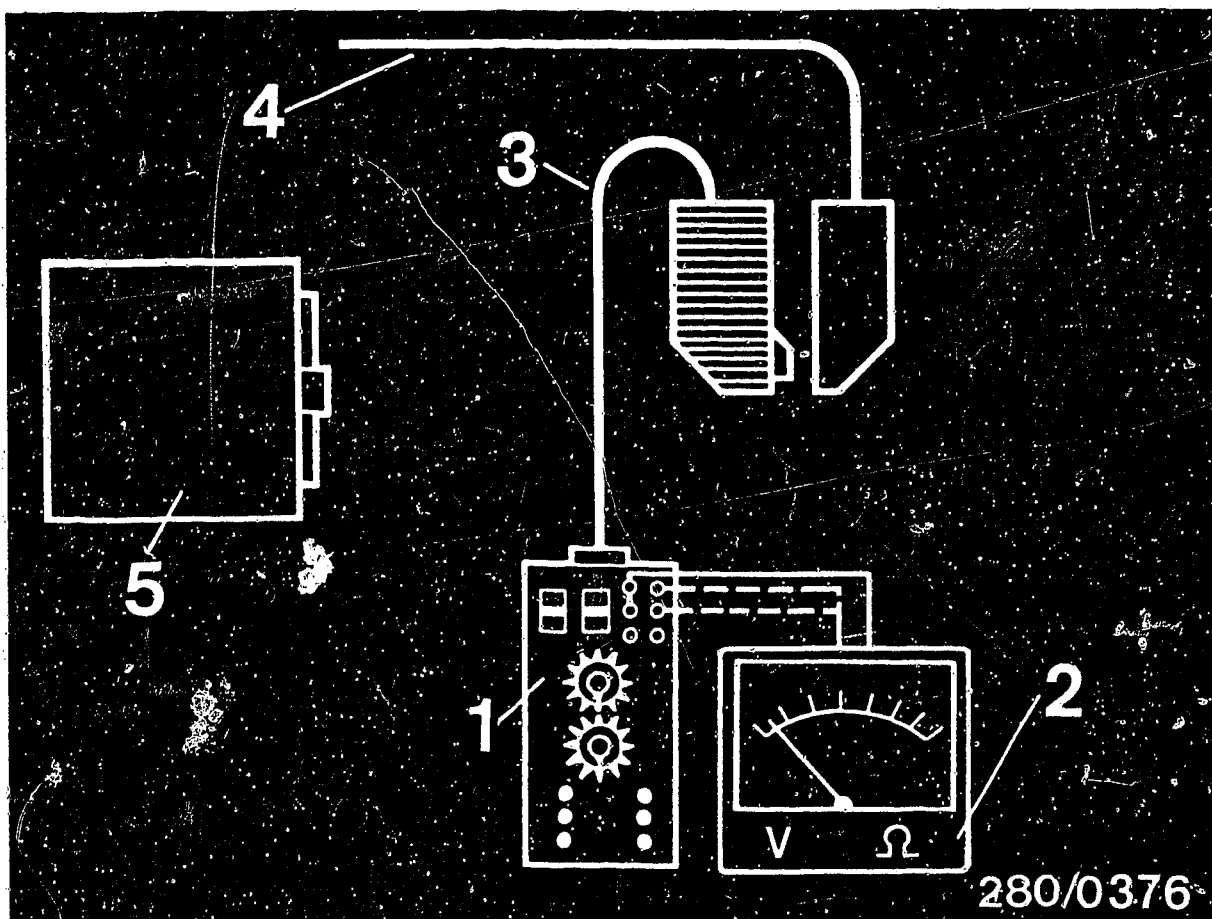




Universal test adapter with adapter lead for the L-Jetronic (version LE/LU)

- 1 = Adapter lead (Part No.: 1 684 463 123)
- 2 = Universal test adapter (Part No. 0 684 101 801)
- 3 = Test wells (for motortester)
- 4 = Test sockets (for measuring voltage)
- 5 = Test sockets (for measuring resistance)
- 6 = Test sockets (not yet assigned)
- 7 = Program switch "V"
- 8 = Program switch " Ω "
- 9 = Buttons (not assigned for the LE/LU version)





1 = Universal test adapter
2 = Multimeter
3 = Adapter lead (LE/LU)

4 = Jetronic wiring harness
5 = LE/LU control unit

General information:

The universal test adapter is connected to the vehicle wiring harness via the adapter lead.

N. B.:

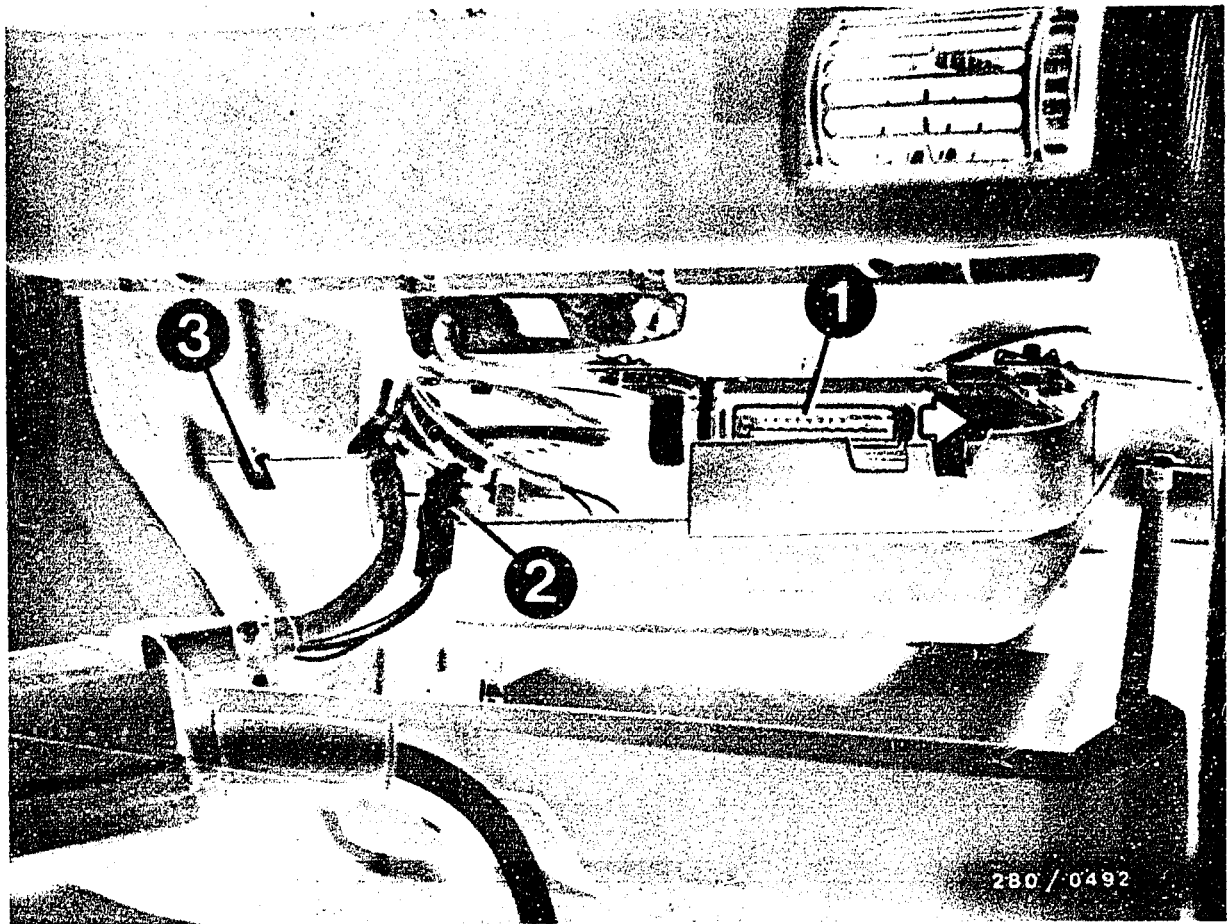
Plug in and unplug the universal test adapter only with the ignition switched off.

Testing:

For testing, a multimeter with R_i min. $20 \text{ k}\Omega/\text{V}$ is connected to the test adapter.

In addition, the signal from Term. 1 and/or Term. TD of the ignition coil can be measured with a motortester via the special input.





- 1 = Control unit
- 2 = Plug connection Term. 1 (Europe - lead black/blue, US - lead black)
- 3 = Fastening screws for the control unit cover

To connect the universal test adapter, unplug the multiple plug (25-pole). To do that, press the detent in the direction shown by the arrow.

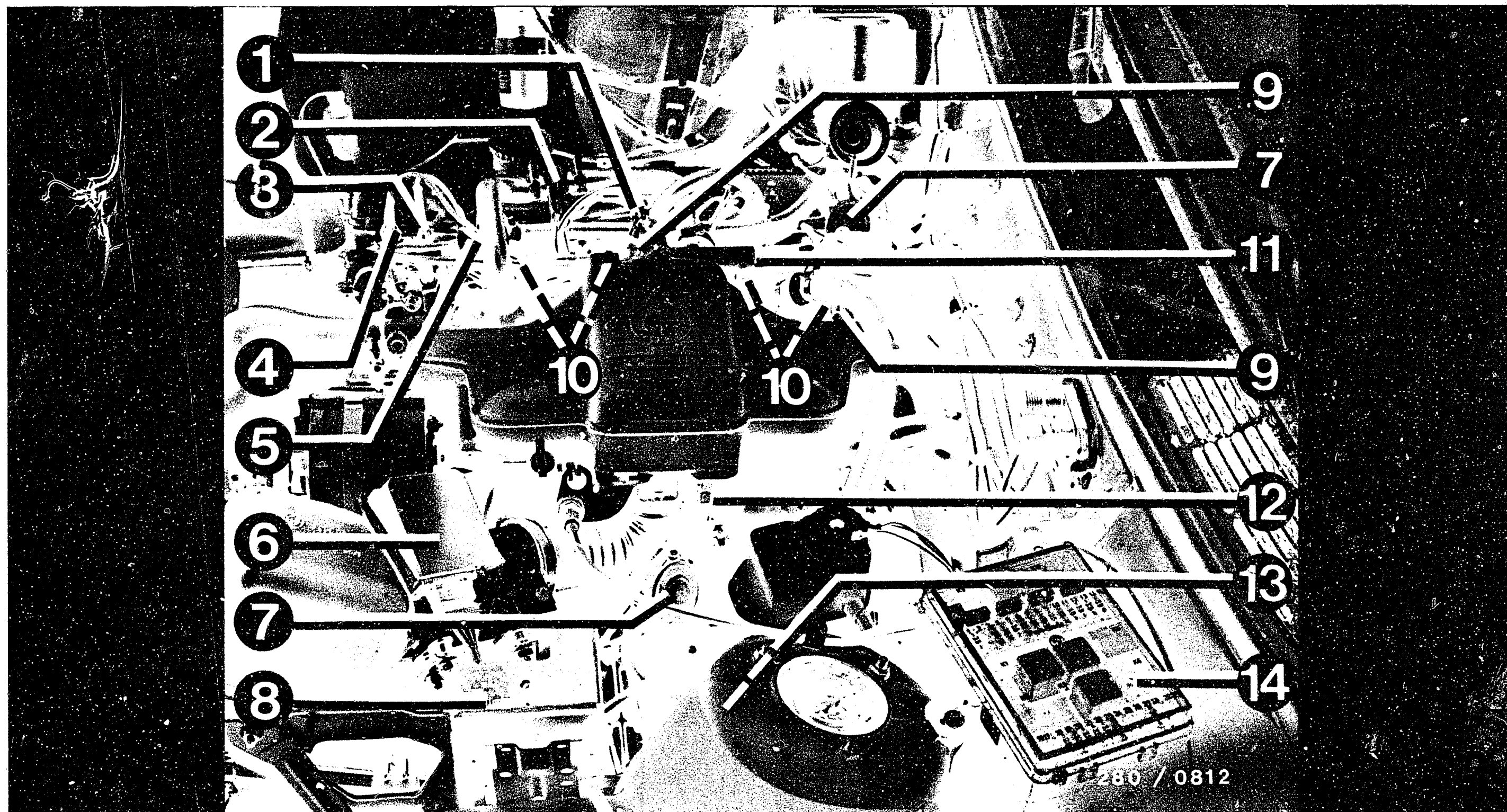
INSTALLATION POSITION OF THE COMPONENTS

The installation positions are always indicated with reference to the forward direction of vehicle travel.

Control unit:

The control unit is in the passenger compartment, behind a cover in the glove compartment, on the front passenger's side.





Installation position of the components BMW 318i (Europe):

- | | | |
|--|-------------------------------------|---------------------------------|
| 1 = Electric starting valve | 6 = Air-flow sensor | 11 = Idle-speed adjusting screw |
| 2 = Auxiliary-air device | 7 = Fuel-line pressure damper | 12 = Throttle valve switch |
| 3 = Temperature sensor II (white plug) | 8 = Control relay (under cover) | 13 = Fuel filter |
| 4 = Thermostime switch (brown plug) | 9 = Ground terminals | 14 = Pump fuse No. 11 |
| 5 = Pressure regulator | 10 = Electric fuel-injection valves | |

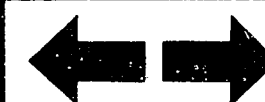
B2

Installation position of the components
BMW 318i, 518i



B3

Installation position of the components
BMW 318i, 518i



Electric fuel pump: Under the vehicle, on the left in front of the rear wheel.

Model for Sweden/
Switzerland:

Natural aspiration air valves cross-wise in front of the engine block.

Model for the US:

Lambda sensor: on the right in the exhaust manifold. Separation point for sensor lead: between the battery and the ignition distributor.

Pressure sensor: on the air filter housing to the right of the idle speed control (non-Bosch system), in place of the auxiliary-air device.



IMPORTANT GENERAL INSTRUCTIONS

1. Never start the engine without the battery being firmly connected.
2. It is not permissible to assist start-up using more than 16 V or using a fast battery charger!
3. Never separate the battery from the vehicle electrical system with the engine running.
4. When fast charging the battery, disconnect it from the vehicle electrical system
5. Remove the control unit at temperatures above +80°C (paint drying oven).
6. Make certain all connecting plugs on the wiring harness are properly seated.
7. Never connect or disconnect the wiring harness plug of the control unit with the ignition switched on.
8. When checking the compression pressure, disconnect the red power supply lead between the battery and the relay set by taking the plug connection apart. This interrupts the power supply for the LE/LU version and with that, for the electric fuel-injection valves as well. Undesired fuel injection is thereby prevented.
9. The LE/LU control unit must be taken out during electrical welding (e.g., spot welding).
10. When applying the trouble-shooting below, it is assumed that the engine is O.K. and that the ignition has been properly adjusted. The electrical system must be checked and, if need be, repaired.
11. To install an alarm system, proceed in accordance with microfiche card ALL-500.

In order to be able to perform the testing jobs described in these instructions and to evaluate the components, one should be familiar with the L-Jetronic and how it operates. The essential points on the operation and the structure of the L-Jetronic have been described in the Technical Instruction VDT-U 3/3 En.



TROUBLE-SHOOTING CHARTS

The purpose of the trouble-shooting charts below is to make it possible for workshop employees to identify quickly the causes of defects on the LE/LU version when using the universal test adapter with the adapter lead (1 684 463 123) and other suitable test equipment. A choice can be made between the working procedures below, depending on the training and experience of the mechanic:

- the detailed, step-by-step trouble-shooting chart for employees with little experience and practice on vehicles with the LE/LU version. Starting according to the customer complaint in each instance leads to a complete trouble-shooting program.
- targeted trouble-shooting plan leading directly to the cause of the defect, for trained and experienced employees with a fairly large amount of practical experience on vehicles with the LE version.
Starting according to the customer complaint is made optionally at a given component within the trouble-shooting program.

Both trouble-shooting charts start with checking the electric/electronic portion of the LE/LU version using the universal test adapter and the adapter lead. With these, the wiring harness and the components connected to it are checked within a short time for their electrical operation and any defects are identified.
If no defects are found using the universal test adapter, the fuel pressure test must be run.

If no defects are found here either, one must continue with the detailed or the targeted trouble-shooting chart.

C3

C5

C1

Trouble-shooting charts
BMW 318i, 518i



C2

Trouble-shooting charts
BMW 318i, 518i



Detailed, step-by-step trouble-shooting chart for the complete trouble-shooting program

- Electrical test with the universal test adapter, adapter lead 1 684 463 123 and a motortester or multimeter

This test must always be placed at the start of the testing program and run from start through to end (Coordinates C9...D9).

- Fuel pressure test using pressure gauge

This test must always be run after the test with the universal test adapter and is to be run from start through to end (Coordinates D10...D21).

- Trouble-shooting according to customer complaints (defect symptoms)

The table below contains possible defect symptoms and, in the column at the right, the starting coordinates for the detailed trouble-shooting program pertaining to these. This program consists of test procedures in a proper sequence for all individual components of the LE/LU version. If, after conclusion of the trouble-shooting program for an assumed symptom, the defect has not been identified and corrected, a different program must be chosen and carried out using a new defect symptom.

<u>Customer complaints (defect symptoms)</u>	<u>Electrical test with universal test adapter</u>	<u>Fuel pressure test with pressure gauge</u>	<u>Coordinates</u>
1. Starting motor turns, engine does not start or starts only with difficulty	C 9	D 10	E 1
2. Engine starts and then dies	C 9	D 10	F 1
3. Rough idle or incorrect idle speed	C 9	D 10	F 11
4. Poor throttle take-up	C 9	D 10	H 3
5. Engine missing in all driving conditions	C 9	D 10	J 1
6. Poor mileage	C 9	D 10	K 7
7. No maximum power attained, maximum speed is not reached	C 9	D 10	K 21
8. Idle speed and CO-adjustment too low or too high	C 9	D 10	L 11
9. Checking the idle speed control	C 9	D 10	G 13
10. Checking the Lambda closed-loop control	C 9	D 10	G 17

C3

Trouble-shooting

BMW 318i, 518i



C4

Trouble-shooting

BMW 318i, 518i



Targeted trouble-shooting chart leading directly to the cause of the defect, for components within the trouble-shooting programs

- Electrical test with the universal test adapter, adapter lead 1 684 463 123 and a motortester or multimeter

The test with the universal test adapter must always be placed at the start of the testing program and run from start through to end (Coordinates C9...D9).

- Fuel pressure test with pressure gauge

The fuel pressure test must always be run after the test with the universal test adapter and is to be run from start through to end (Coordinates D10...D21).

- Trouble-shooting according to the customer complaint

The table below contains various defect symptoms and several possible defect causes in each instance. The reference block indicates the initial coordinates for the test procedure on the individual components of the LE/LU version involved. If, after completion of the test on the individual components, the defect has not been identified or corrected, a new defect symptom must be determined.

Customer complaints (defect symptoms)

1. Starting motor turns, engine does not start or starts only with difficulty								
2. Engine starts and then dies								
3. Rough idle or incorrect idle speed								
4. Poor throttle take-up								
5. Engine missing in all driving conditions								
6. Poor mileage								
7. No maximum power attained, or maximum speed is not reached								
8. Idle speed and CO-level too low or too high								
<u>Cause</u> (component defect)								
C9	C9	C9	C9	C9	C9	C9	C9	Defects in the electric system. Testing with universal test adapter
D10	D10	D10	D10	D10	D10	D10	D10	Defects in the fuel supply system: (check control relay, pump fuse, electric fuel pump, fuel pressure, and pressure regulator. The fuel pressure does not remain constant).
E9	F5		H7					Auxiliary-air device does not open
		F15						Auxiliary-air device does not close
E11		G3	H9	J5	K15	L5	L19	Air-flow sensor is defective, check the potentiometer (noise test)
E15								Engine coughing during the start
E13								Hot start

C5

Trouble-shooting

BMW 318i, 518i



C6

Trouble-shooting

BMW 318i, 518i



Customer complaints (defect symptoms)

1. Starting motor turns, engine does not start or starts only with difficulty
2. Engine starts and then dies
3. Rough idle or incorrect idle speed
4. Poor throttle take-up
5. Engine missing in all driving conditions
6. Poor mileage
7. No maximum power attained, or maximum speed is not reached
8. Idle speed and CO-level too low or too high

Cause (component defect)

E7		F17						Thermotime switch defective
E17	F7	G5	H17			L7	L23	Leaks in the intake system
		F23		J17	K11			Electric fuel-injection valves defective. Connect up test lead, repair
E3								Electric starting valve is not opening
E5	F3	F19			K9		L21	Electric starting valve is leaking
				J11		L3		Fuel delivery from electric fuel pump too little
						K23		Exhaust catalytic convertor, Lambda sensor replacement interval
		F13	H5					Throttle valve is not closing.(Check overrun cutoff.)Throttle valve switch (setting)
						K23		Throttle valve is not opening completely
				J15				Overrun cutoff
				J3				Breaks in wiring harness and plug connections. Interference, missing, ground contact
			H15	K1				Engine bucking
		G9	H21		K17		L13	CO-exhaust setting too rich, idle adjustment
		G9	H21	K3			L13	CO-exhaust setting too lean, idle adjustment, engine coughing
				J13		L1		Control unit defective
		G13	G13	G13	G13		G13	Idle speed control defective
		G17	G17	G17	G17		G17	Lambda closed-loop control defective

C7

Trouble-shooting

BMW 318i, 518i



C8

Trouble-shooting

BMW 318i, 518i



TEST CHART FOR THE UNIVERSAL TEST ADAPTER

with adapter lead 1 684 463 123 connected for the LE version in the BMW 318i for Europe and 318i Sweden/Switzerland after 9.83, and the LU version in the BMW 318i for the US after 1.83

- Before testing with the universal test adapter, check all multiple plug connections for loose contacts. Clean dirty or corroded plug contacts.
- Watch for blade receptacles that have been pushed back. If need be, rebend the contact prong and press the receptacle into the plug housing down to the stop. The catch locks in.
- Suspect breaks in the lead at points that are bent sharply or crimped.

Installation position of the control unit: Behind a cover under the glove compartment on the front passenger's side.

Only peripheral equipment of the electric system (not including the control unit) is checked using the universal test adapter.

Disconnect the control unit plug on the Jetronic wiring harness from the control unit, and connect with the plug of the adapter lead. (The ignition must be switched off.) Connect a multimeter for measuring voltage and resistance and a motortester to the universal test adapter in order to take measurements.

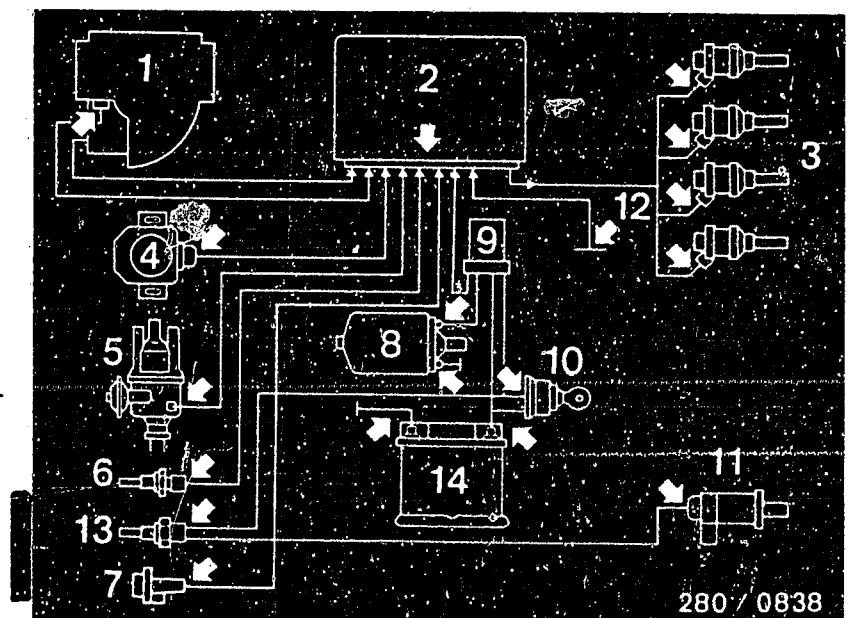
The individual test steps are selected via two program switches (one for measuring voltages, the other for measuring resistances). Each program switch has 24 test settings, only some of which are assigned in the case of the LE/LU version. If a defect is found during a test, that test must be repeated once the defect has been corrected.

Always carry out the complete test with the universal test adapter.

Be absolutely certain to follow the instructions in the test chart!

- In test steps 1...3, the voltages are measured during the start. Set the multimeter at "measuring range for voltage". (BMW 318i, US: test steps 1...4)
- In test steps 4...10, resistances are measured. Set the multimeter at "measuring range for resistance". (BMW 318i, US: test steps 5...11)

The test specifications and instructions for operation of the universal test adapter are included in the test chart below.



Electrical plug connections (arrows)

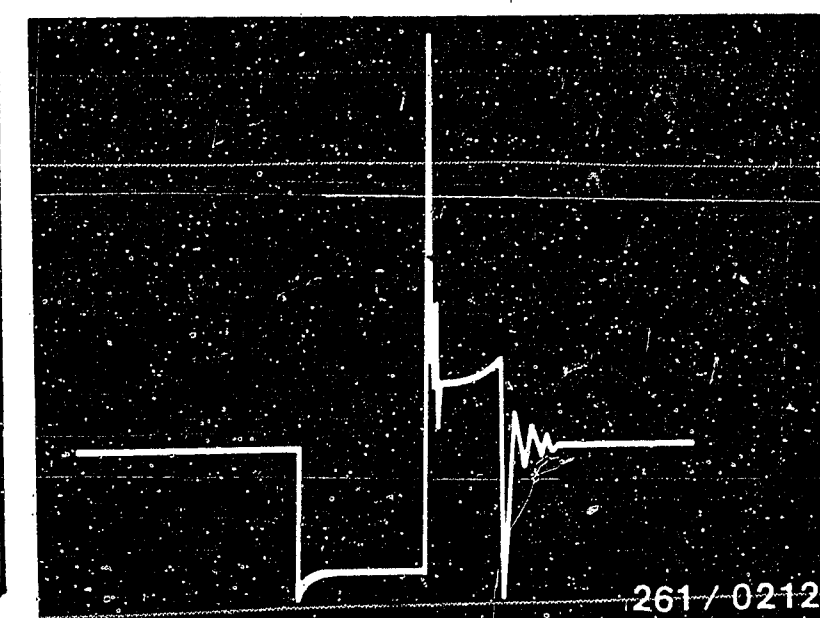
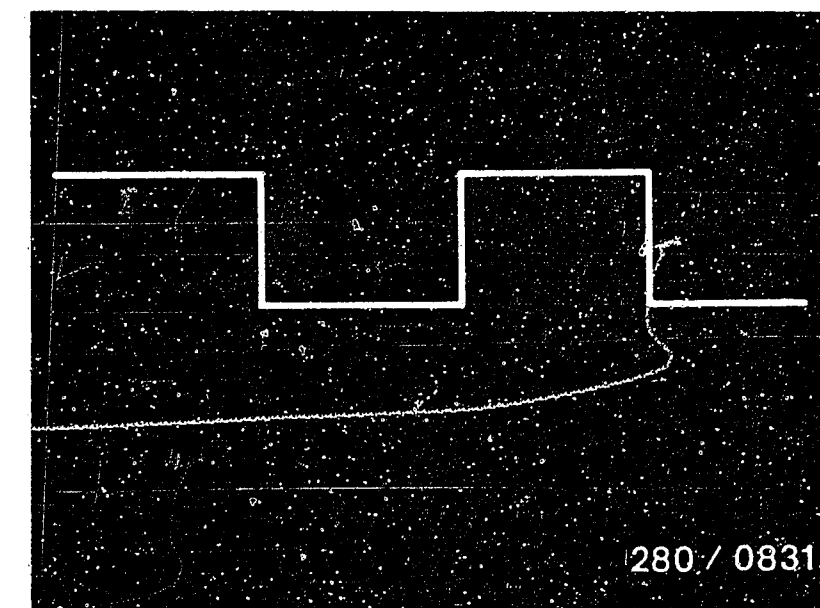
- 1=Air-flow sensor
- 2=Control unit
- 3=Electric fuel-injection valves
- 4=Throttle valve switch
- 5=Ignition distributor
- 6=Temperature sensor (engine)
- 7=Auxiliary-air device
- 8=Electric fuel pump
- 9=Control relay
- 10=Ignition lock
- 11=Electric starting valve
- 12=Central ground
- 13=Thermotime switch
- 14=Battery



Instructions: For the test steps below, a white border in the column "operation" indicates what operation is to be changed as compared to the preceding test step.

TEST STEP 1

Operation		Reading	Testing
Program switch "V" in setting	5	Models for Eur/Swed/Swi: TD-signal present (see Figure at top) Model for US: Primary signal present (see Figure at center)	Component: Models for Eur/Swed/Swi: TD-signal from the ignition trigger box Term. 4 Model for US: Term. 1 signal from the ignition trigger box Term. 16
Program switch "Ω" in setting:	-*		
Test equipment: Ignition oscilloscope		<div><div>yes</div><div>no</div></div> <div>Continue testing with next test.</div>	Operation: Voltage pulses Triggering of the control unit by the ignition
Range of measurement: Special input Control lever at stop at left, and range of measurement 20 V			
Connection: Test wells			Malfunction: No reading
Operation in vehicle: Ignition "ON". Start engine.			



Trouble-shooting: For testing, disconnect the control unit plug from the test adapter, and if necessary, use a wiring diagram.

Check the following leads with an ohmmeter for continuity (specified value approx. 0 Ω):

Models for Europe/Sweden/Switzerland:

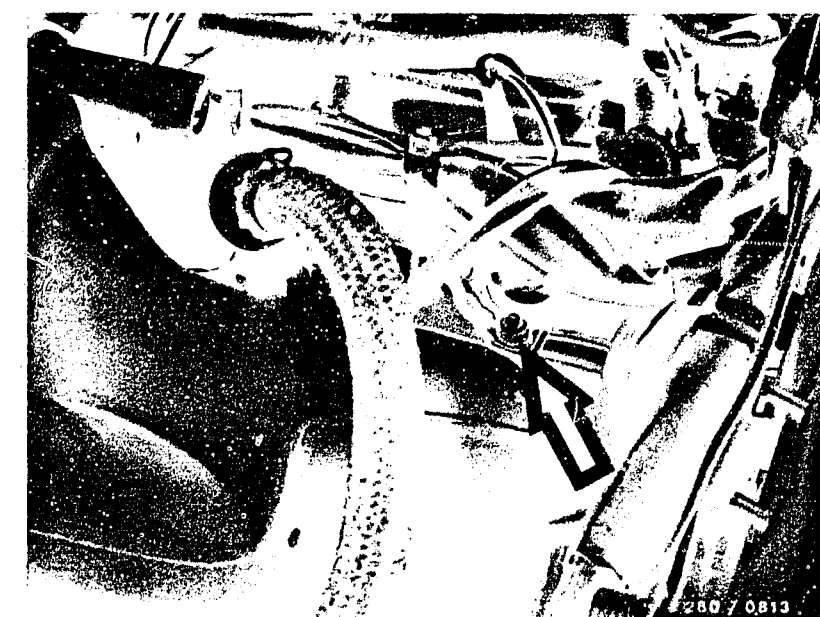
- From the control unit plug Term. 1 to the ignition trigger-box Term. 4.
- From the control unit plug Term. 5 to the ground terminal output stage (Figure at bottom, arrow).

Model for US only:

- From the control unit plug Term. 1 to the ignition trigger-box Term. 16
- Eliminate contact resistances in the plug connections.

If the reading for an ignition pulse is still missing → check the ignition system.

* Switch setting has not been established.



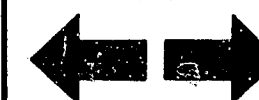
C11

Test chart for universal test adapter
BMW 318i, 518i



C12

Test chart for universal test adapter
BMW 318i, 518i



TEST STEP 2			
Operation		Reading	Testing
<u>Program switch "V"</u> <u>in setting</u>	6	The reading on the tester must be <u>8 ... 15 V</u>	<u>Component:</u> Control relay Voltage supply
<u>Program switch "Ω"</u> <u>in setting</u>	-		
<u>Test equipment:</u> Motortester or multimeter (volt range)		<div><div>yes</div><div>↓</div><div>Continue testing with next test.</div></div> <div><div>no</div><div>↓</div><div></div></div>	<u>Operation:</u> Voltage supply from Term. 87
<u>Range of measurement:</u> 0 ... 15 V			
<u>Connection:</u> Red (plus) and black (minus) test sockets			
<u>Operation in vehicle:</u> Ignition "ON". Start engine.			<u>Malfunction:</u> No reading for voltage.

Trouble-shooting:

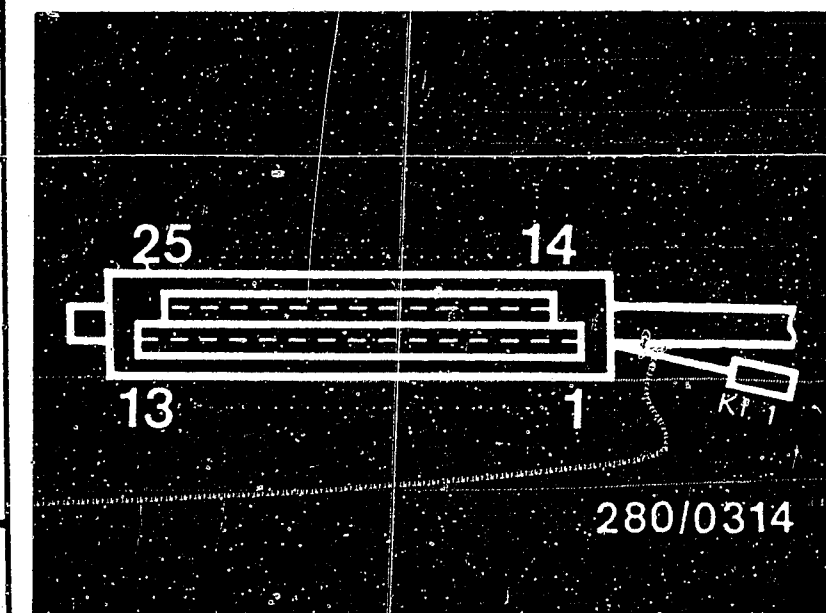
For testing, disconnect control unit plug from the test adapter, and if necessary, use a wiring diagram.

Check the following leads with an ohmmeter for continuity:
(specified value approx. 0 Ω):

- From the control unit plug Term. 9 to the control relay Term. 87.
- From the control relay Term. 30 to battery (pos.)

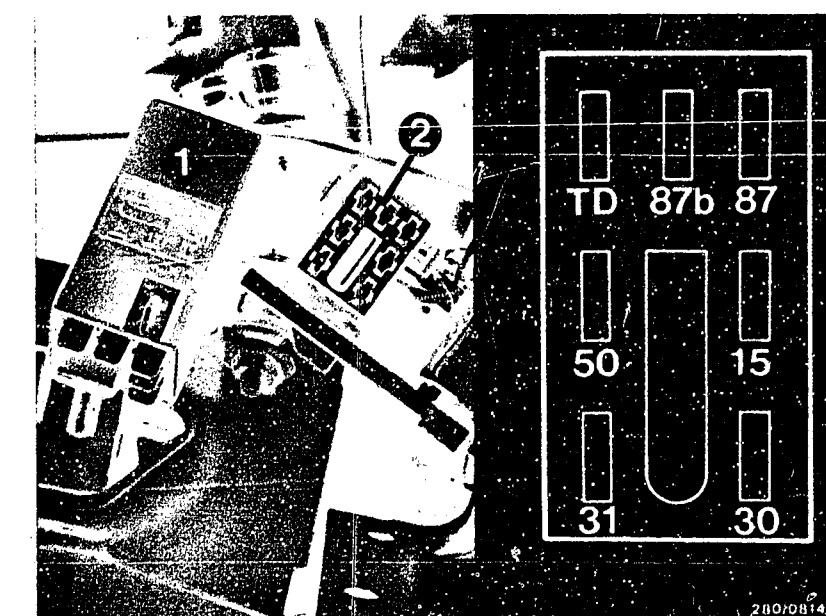
Caution! Disconnect the battery!

Eliminate contact resistances in the plug connections and/or take out and replace the control relay.



Top view of control
unit plug

1=Control relay
2=(top view of connection
socket)
US model similar



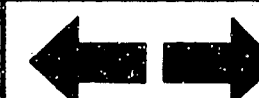
C13

Test chart for universal test adapter
BMW 318i, 518i

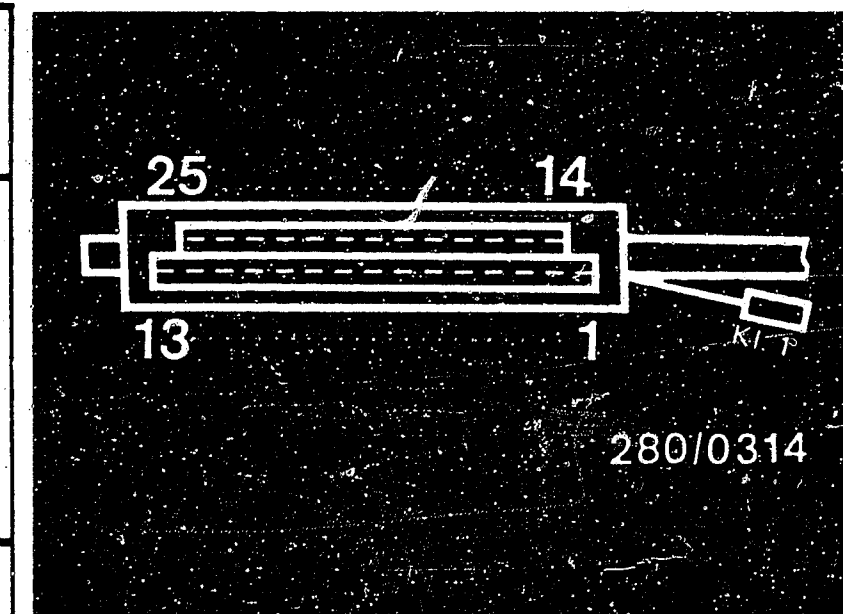


C14

Test chart for universal test adapter
BMW 318i, 518i



TEST STEP 3			
Operation		Reading	Testing
<u>Program switch "V"</u> <u>in setting</u>	7	The reading on the tester must be <u>8 ... 15 V</u>	<u>Component:</u> Control relay Starting motor Term. 50
<u>Program switch "Ω"</u> <u>in setting</u>	-		
<u>Test equipment:</u> Motortester or multimeter (volt range)		<div><div>yes</div><div>↓</div><div>Continue testing with next test <u>step.</u></div></div> <div><div>no</div><div>↓</div></div>	<u>Operation:</u> Starting signal
<u>Range of measurement:</u> 0 ... 15 V			
<u>Connection:</u> Red (plus) and black (minus) test sockets			<u>Malfunction:</u> No reading for voltage.
<u>Operation in vehicle:</u> Ignition "ON". Start engine.			



Top view of control unit plug

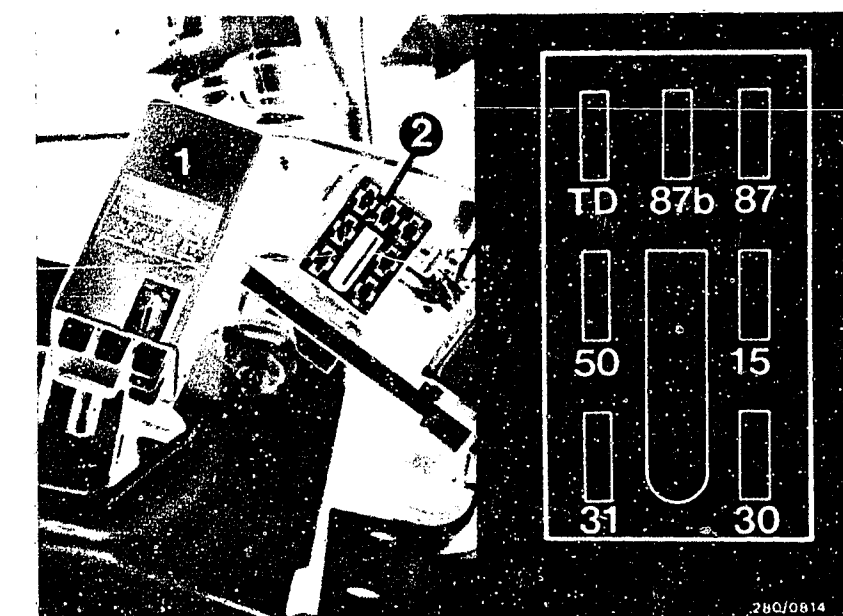
1=Control relay
2=(Top view of connection socket)

Trouble-shooting:

For testing, disconnect the control unit plug from the test adapter. If necessary, use a wiring diagram.

Check the following leads with an ohmmeter for continuity (specified value: approx. 0 Ω):

- From the control unit plug Term. 4 to the control relay Term. 50
- From the control relay Term. 50 to the starting motor Term. 50.
- Eliminate contact resistances at the plug connections



C15

Test chart for universal test adapter
BMW 318i, 518i

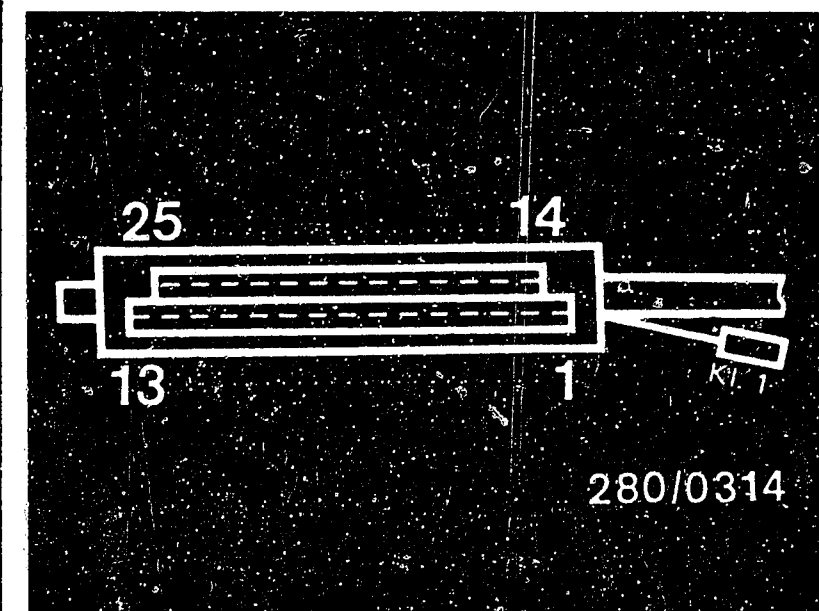


C16

Test chart for universal test adapter
BMW 318i, 518i

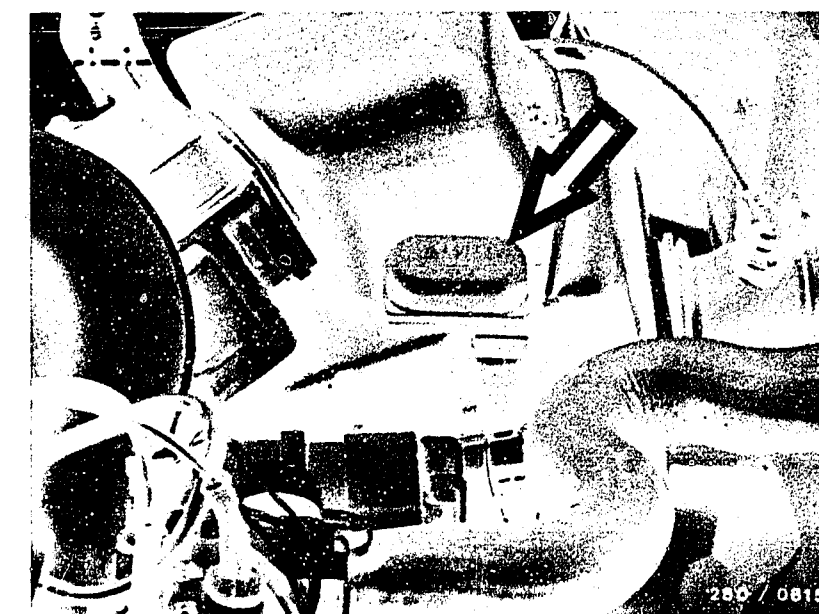


TEST STEP 4		N. B.! For US model only	
Operation		Reading	Testing
Program switch "V" in setting:	8	The reading on the tester must be 2.0...4.0 V at approx. 300 m elev. and 8.0...12.0 V at approx. 4000 m elev.	Component: Pressure sensor (altitude sensor), Term. 11
Program switch "Ω" in setting	-		
Test equipment: Motortester or multimeter (V-range)			Operation: Voltage signal depend on the elevation above sea level Leaning of the mixture as function of elevation.
Range of measurement: 0...15 V		<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> yes ↓ Continue testing with next test step. </div> <div style="text-align: center;"> no ↓ </div> </div>	Malfunction: Reading for voltage not within tolerance
Connection: Red (plus) and black (minus) test sockets			
Operation in vehicle: Ignition "ON". Start engine.			



Top view of control unit plug

Arrow=Pressure sensor



Trouble-shooting: For testing, disconnect the control unit plug from the test adapter and, if necessary, use a wiring diagram.

Check the following leads with an ohmmeter for continuity (specified value: approx. 0 Ω):




- From the control unit plug Term. 11 to the pressure sensor Term. 1
- From the pressure sensor Term. 2 to the ground terminal output stage.
- From the pressure sensor Term. 3 to the control unit plug Term. 9.
- Eliminate contact resistances at the plug connections.

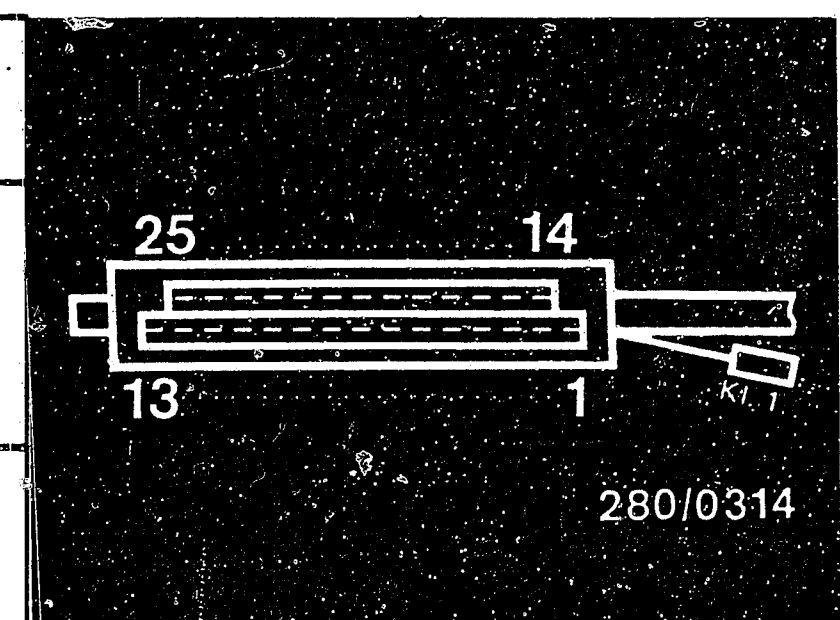
If the reading for voltage is still missing → take out and replace the pressure sensor.

Installation position of the components:

Ground terminal output stage: On the mounting bracket for the fuel delivery and fuel return lines on the intake manifold, near the engine bulkhead.

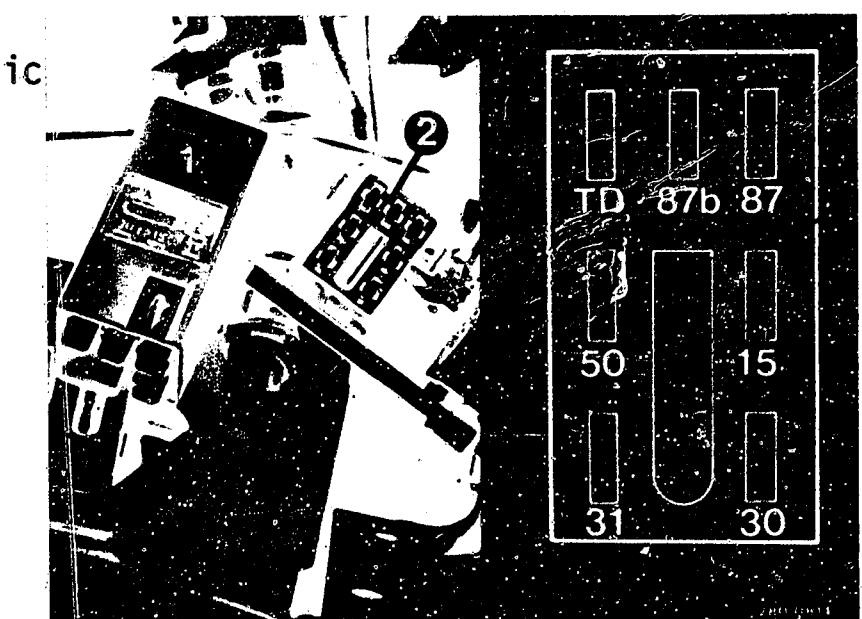


TEST STEP 5			
Operation	Reading	Testing	
<div>Program switch "V" in setting:</div> <div></div>	Reading on tester must be <u>100 ... 200 Ω</u>	<u>Component:</u> Air-flow sensor (temperature sensor I)	
<div>Program switch "Ω" in setting</div> <div>11</div>			
<div>Test equipment: Motortester or multimeter (Ω-range)</div>	<div>yes</div> <div></div> <div>Continue testing with next test step.</div>	<u>Operation:</u> Resistance from control unit plug Term. 8 to the ground terminal output stage.	
<div>Range of measurement: x 10 Ω</div>			
<div>Connection: Blue test sockets</div>		<div>no</div> <div></div>	<u>Malfunction:</u> Resistance not within tolerance.
<div>Operation in vehicle: -----</div>			



Top view of control unit plug

1=Control relay
2=(Top view of connection socket)



Trouble-shooting: For testing, disconnect the control unit plug from the test adapter and, if necessary, use a wiring diagram.

Check the following leads with an ohmmeter for continuity (specified value approx. 0 Ω):

Air-flow sensor

- From the control unit plug Term. 8 to the air-flow sensor Term. 8.
- From the air-flow sensor Term. 5 to the ground terminal output stage.

Electric fuel pump

- From the control relay Term. 87b via the pump fuse (in fuse box No. 11) to the electric fuel pump (pos. connection).
- From the electric fuel pump (neg. connection) to the ground connection-vehicle body (on the left, under the rear seat bench).

Auxiliary-air device

- From the auxiliary-air device Term. 9 to the control unit plug Term. 9.
- From the auxiliary-air device Term. 26 to the ground terminal output stage.
- Test specification on the auxiliary-air device: 30 ... 65 Ω
- Eliminate contact resistances in the plug connections.

Installation position of the components:

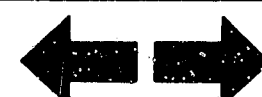
Air-flow sensor: On the left, on the air filter cover.

Auxiliary-air device: Between the intake manifold and the valve cover.

Ground terminal output stage: On the mounting bracket for the fuel delivery and return lines on the intake manifold, near the engine bulkhead

C19

Test chart for universal test adapter
BMW 318i, 518i

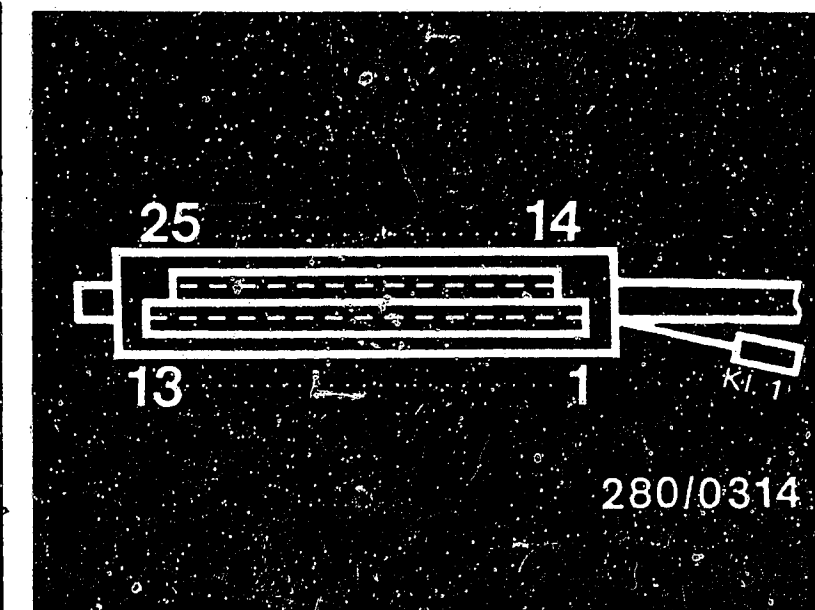


C20

Test chart for universal test adapter
BMW 318i, 518i



TEST STEP 6			
Operation		Reading	Testing
Program switch "V" in setting:	↓	Reading on tester must be 60 ... 1000 Ω	Component: Air- flow sensor (potentiometer)
Program switch "Ω" in setting:	12		
Test equipment: Motortester or multimeter (Ω range)		<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> yes ↓ Continue testing with next test step. </div> <div style="text-align: center;"> no ↓ </div> </div>	Operation: Resistance from the control unit plug Term. 7 to the ground terminal output stage.
Range of measurement: x 10 Ω			Malfunction: Resistance not within tolerance.
Connection: Blue test sockets			
Operation in vehicle: Deflect air-flow sensor flap all the way			



Top view of control unit plug

1=Air-flow sensor
2=CO adjusting-screw

Trouble-shooting:

For testing, disconnect the control unit plug from the test adapter, and, if necessary, use a wiring diagram.

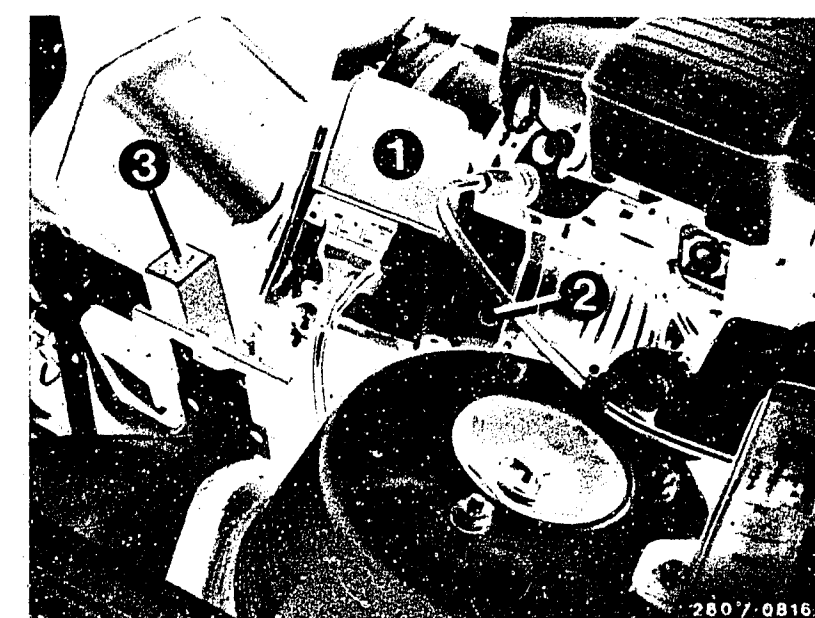
Check the following leads with an ohmmeter for continuity (specified value: approx. 0Ω):

- From the control unit plug Term. 7 to the air-flow sensor Term. 7.
- From the air-flow sensor Term. 5 to the control unit plug Term. 5.

Eliminate contact resistances at the plug connections.

Installation position of the components.

Air-flow sensor: On the left on the air filter cover



C21

Test chart for universal test adapter
BMW 318i, 518i



C22

Test chart for universal test adapter
BMW 318i, 518i



TEST STEP 7

Operation

Program switch "V"
in setting:



Program switch "Ω"
in setting:

13

Test equipment:
Motortester or multimeter
(Ω range)

Range of measurement:
x 10Ω or x 100 Ω

Connection:
Blue test sockets

Operation in vehicle:

Reading

Reading on the tester
must be:
at ambient temperature
(+15°C...+30°C):

1.3...3.6 kΩ

and with engine at
normal operating temp.
(approx. +80°C)

250...390 Ω

yes

no

Continue
testing with
next test
step.

Testing

Component:

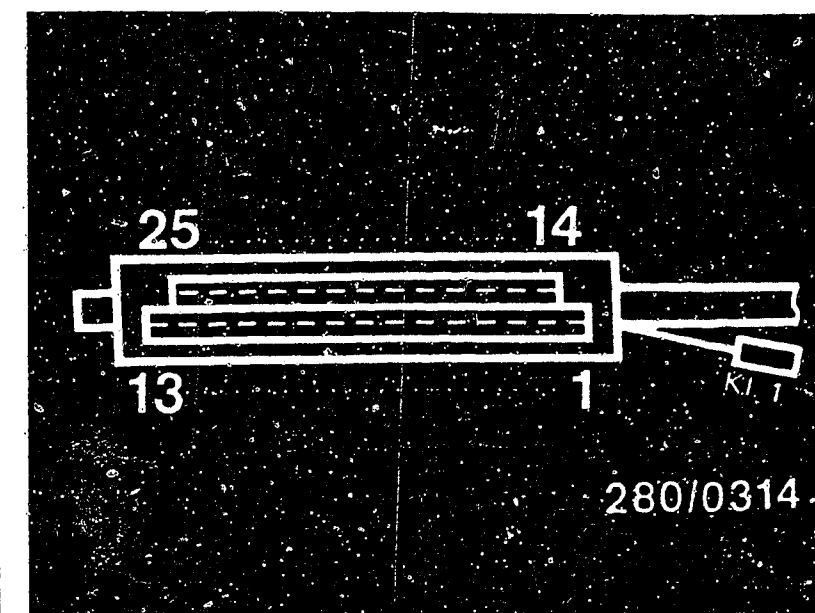
Temperature sensor II
(engine)

Operation:

Resistance from the control
unit plug Term. 10 to the
ground terminal of the
electronic system

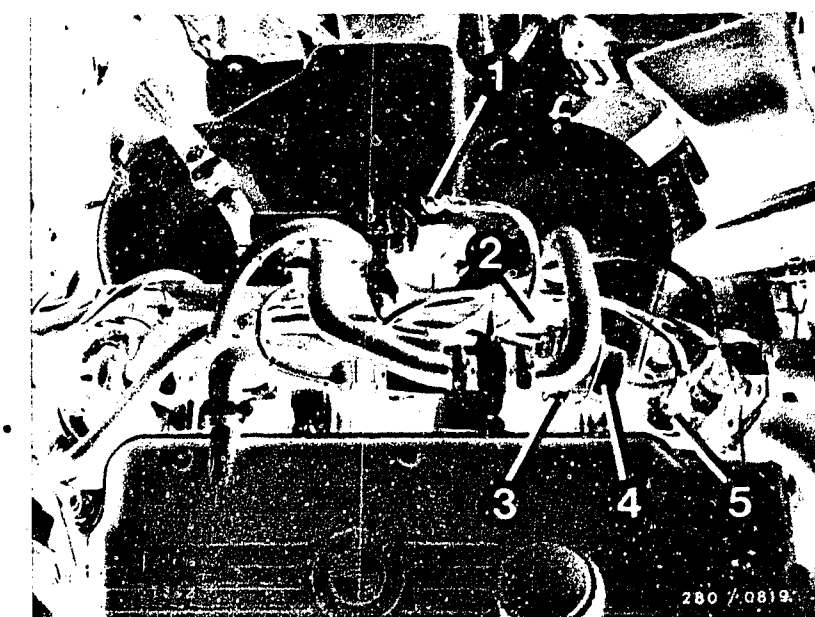
Malfunction:

Resistance not within
tolerance



Top view of the control
unit plug

1=Ground terminal,
electronic system
5=Temperature sensor II
(water)



Trouble-shooting:

For testing, disconnect the control unit plug from the test adapter and, if necessary,
use a wiring diagram.

Measure the resistance directly on the engine temperature sensor (double NTC).

Ambient temperature (+15°C...+30°C): 1.3 ... 3.6 kΩ

engine at normal operating temperature
(+80°C): 250 ... 390 Ω

Check the following leads with an ohmmeter for continuity
(specified value approx. 0Ω):

- From the control unit plug Term. 10 to the temperature sensor II (engine)
- From the temperature sensor Term. 38 to the ground terminal for the electronic system.
- Eliminate any contact resistances in the plug connections.

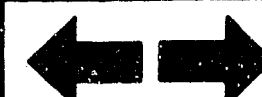
C23

Test chart for universal test adapter
BMW 318i, 518i

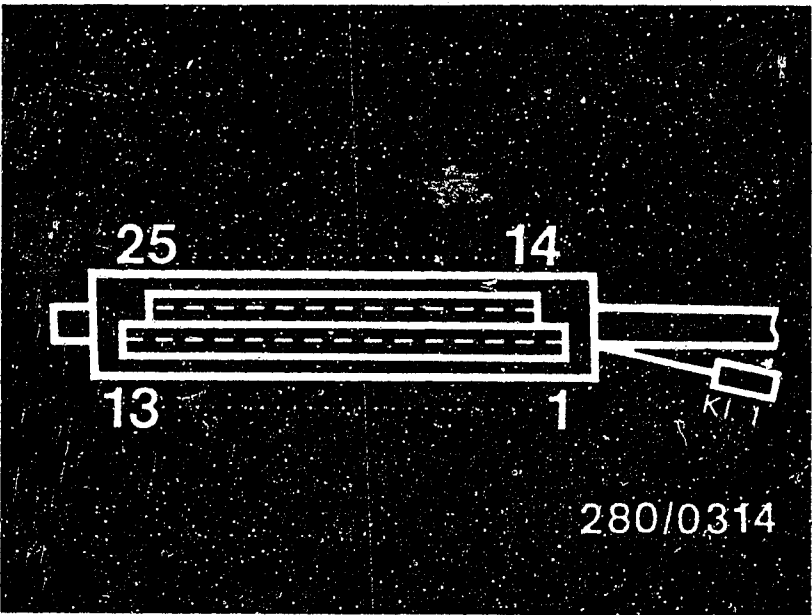


C24

Test chart for universal test adapter
BMW 318i, 518i

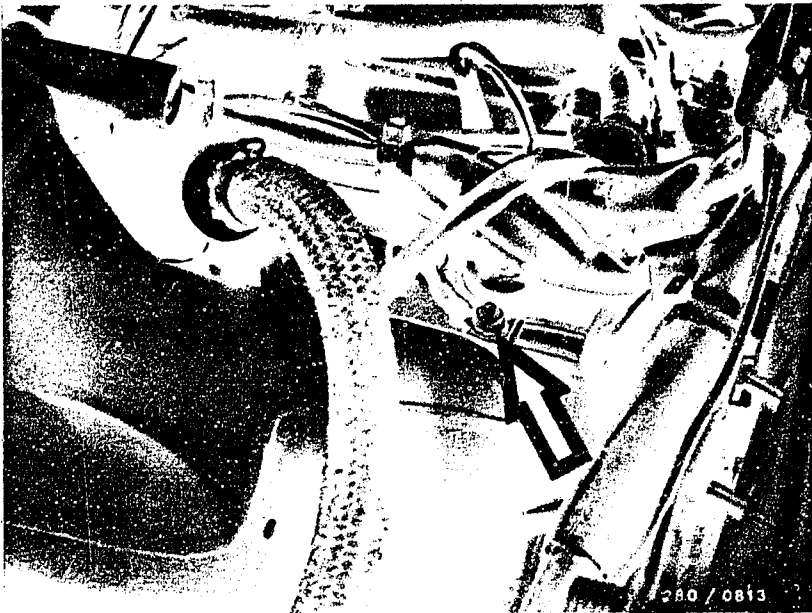


TEST STEP 8				
Operation		Reading	Testing	
Program switch "V" in setting:	↓	The reading on the tester must be 0 ... 10 Ω	<u>Component:</u> Ground connection for the output stage	
Program switch "Ω" in setting:	14			
Test equipment: Motortester or multimeter (Ω range)		<div>yes</div> <div>↓</div> <div>Continue testing with next test step.</div> <div>no</div> <div>↓</div>	<u>Operation:</u> Ground connection from the control unit Term. 13 and Term. 5	
Range of measurement: x 1 Ω			<u>Malfunction:</u> Resistance not within tolerance	
Connection: Blue test sockets				
Operation in vehicle: -----				



Top view of control unit plug

Arrow=Ground terminal, output stage



TEST STEP 9		
Operation	Reading	Testing
Program switch "V" in setting:	<div> <div>↓</div> <div>Reading on tester must be</div> <div>0 ... 10 Ω</div> </div>	<div>Component:</div> <div>Throttle valve switch (idle contact)</div>
Program switch "Ω" in setting:	16	
Test equipment: Motortester or multimeter (Ω range)		<div>Operation:</div> <div>Resistance between control unit plug Term. 2 and Term. 9</div>
Range of measurement: x 1 Ω		
Connection: Blue test sockets		<div>Malfunction:</div> <div>Resistance not within tolerance</div>
Operation in vehicle: Accelerator pedal in at rest position Choke at setting "Zero"	<div>yes</div> <div>↓</div> <div>Continue testing with next test step.</div>	
	no	

Trouble-shooting:

For testing, disconnect the control unit plug from the test adapter and, if necessary, use a wiring diagram.

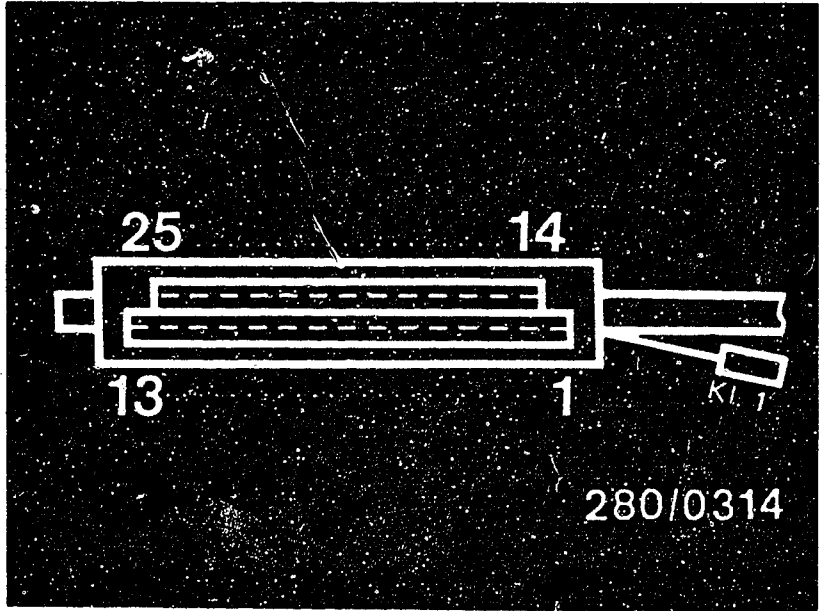
Adjustment of the throttle valve switch

Release the fastening screws for the throttle valve switch somewhat. Connect an ohmmeter at the throttle valve switch between Term. 2 and lead 9 (Term. 18). Turn the throttle valve switch far enough to the right so that the idle contact (microswitch) clicks audibly. (Reading 0 Ω).

Checking the adjustment: Pull on the accelerator cable somewhat. The idle contact (microswitch) must click audibly (reading $\infty\Omega$).

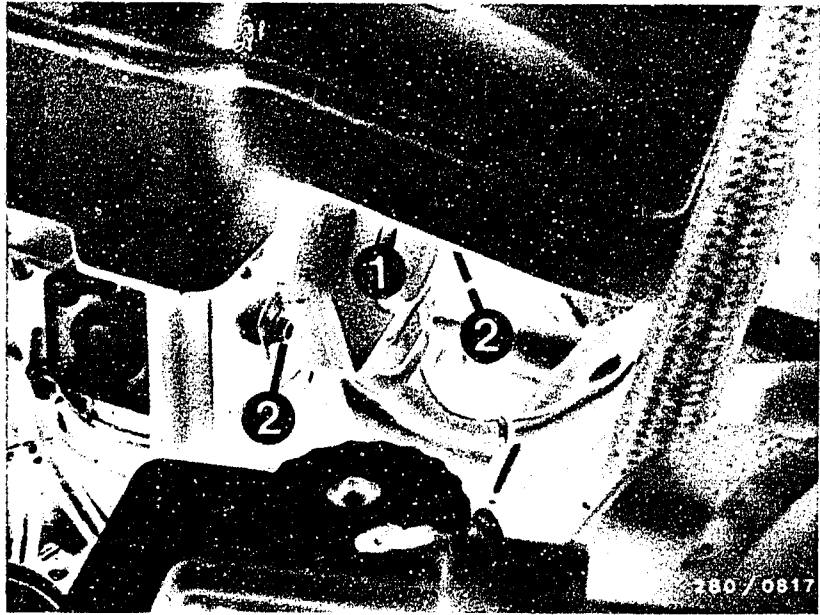
Check the following leads with an ohmmeter for continuity (specified value approx. 0 Ω):

- From the control unit plug Term. 2 to the throttle valve switch Term. 2.
 - From the throttle valve switch lead 9 (Term. 18) to the control unit plug Term. 9
- Eliminate any contact resistances in the plug connections.

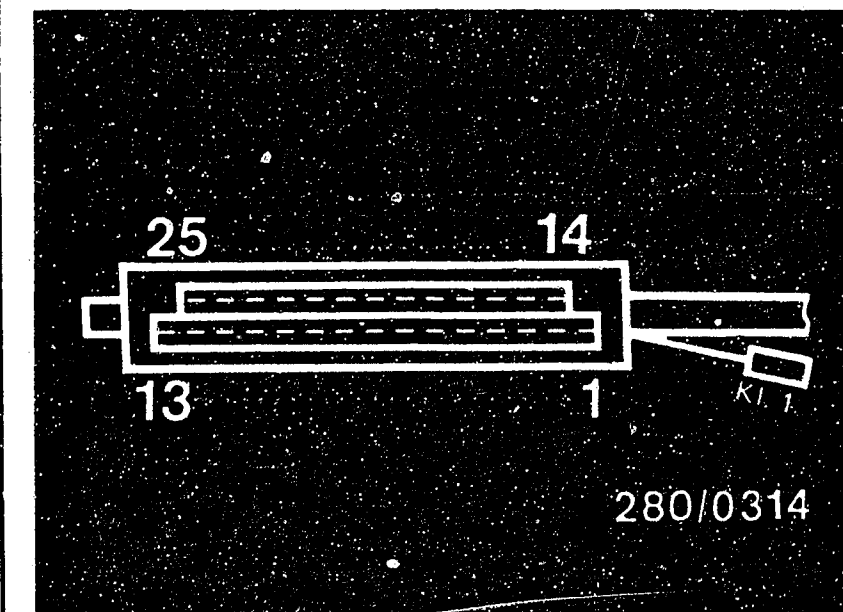


Top view of control unit plug

1 = Throttle valve switch
2 = Fastening screws



TEST STEP 10			
Operation		Reading	Testing
<u>Program switch "V"</u> in setting:	↓	Reading on the tester must be <u>0 ... 10 Ω</u>	<u>Component:</u> Throttle valve switch (full-load contact)
<u>Program switch "Ω"</u> in setting:	17		
<u>Test equipment:</u> Motortester or multimeter (Ω range)		<div>yes</div> <div>↓</div> <div>Continue testing with next test step.</div>	<div><u>Operation:</u> Resistance between control unit plug Term. 3 and Term. 9</div> <div><u>Malfunction:</u> Resistance not within tolerance</div>
<u>Range of measurement:</u> x 1 Ω			
<u>Connection:</u> Blue test sockets			
<u>Operation in vehicle:</u> Step all the way down on the accelerator pedal			



Top view of control unit plug

1 = Throttle valve switch
2 = Fastening screws

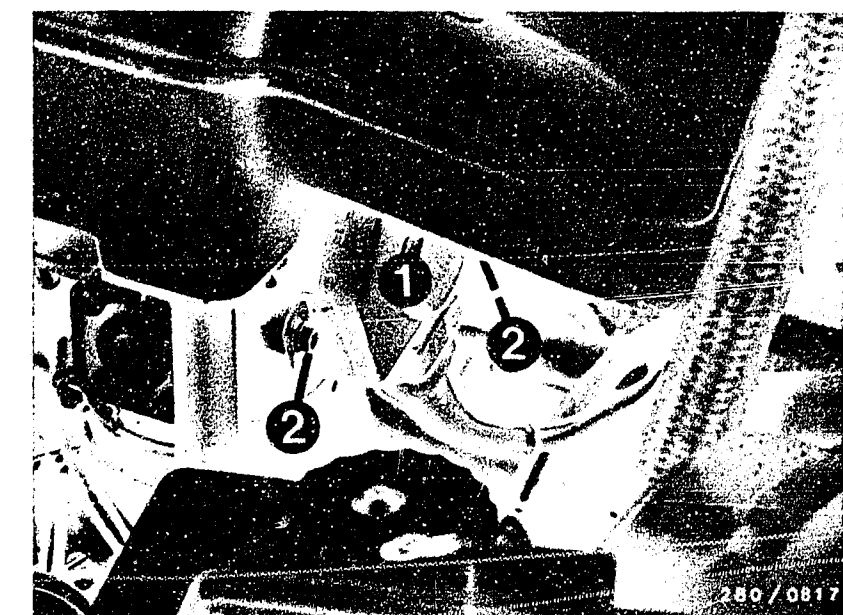
Trouble-shooting:

For testing, disconnect the control unit plug from the test adapter and, if necessary, use a wiring diagram.

Check the following leads with an ohmmeter for continuity (specified value approx. 0Ω):

- From the control unit plug Term. 3 to the throttle valve switch Term. 3
- From the throttle valve switch lead 9 (Term. 18) to the control unit plug Term. 9

Eliminate any contact resistances in the plug connections.



D5

Test chart for universal test adapter
BMW 318i, 518i



D6

Test chart for universal test adapter
BMW 318i, 518i



TEST STEP 11			
Operation		Reading	Testing
Program switch "V" in setting:	↓	Electric fuel-injection valve 0 280 150 209/211 at (+15°C...+30°C):	Component: Electric fuel-injection valves 1, 2, 3 and 4
Program switch "Ω" in setting:	18	7.0 ... 9.5 Ω at +80°C:	
Test equipment: Multimeter (Ω range)		7.2 ... 10.0 Ω	Operation: Resistance on the control unit plug between Term. 12 and Term. 9
Range of measurement: x 1 Ω		Electric fuel-injection valves 0 280 150 703/704 at (+15°C...+30°C):	
Connection: Blue test sockets		6.8 ... 9.3 Ω at +80°C:	Malfunction: Resistance not within tolerance
Operation in vehicle: -----		7.0 ... 9.8 Ω	
		no ↓	

Trouble-shooting:

For testing, disconnect the control unit plug from the test adapter, and, if necessary, use a wiring diagram.

Check the following leads with an ohmmeter for continuity (specified value approx. 0Ω):

- From the control unit plug Term. 12 to the electric fuel-injection valves.
- From the electric fuel-injection valves to the control relay Term. 87.
- From the electric fuel-injection valves to the control unit plug Term. 9.

Measurement of resistance on the electric fuel-injection valve (0 280 150 209/211):

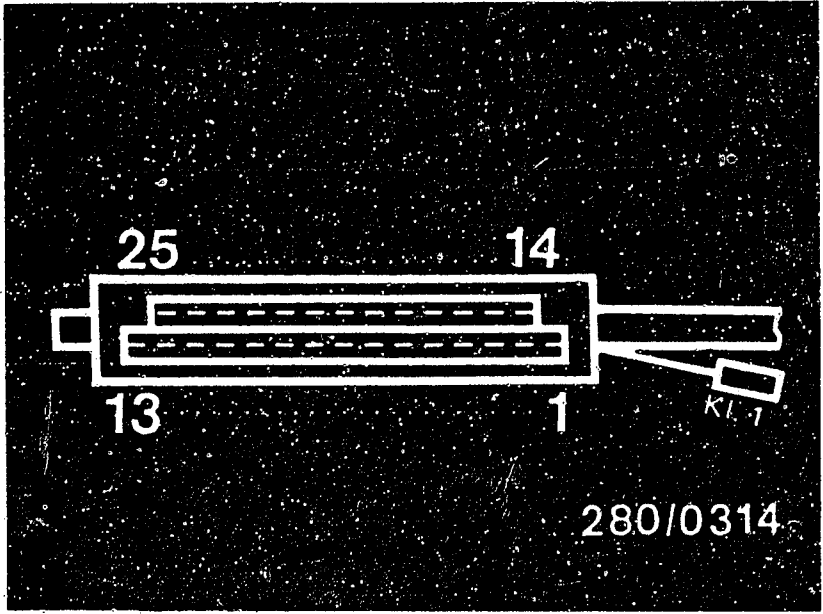
Ambient temperature (+15°C...+30°C): 15...17.5 Ω
with engine at normal operating temperature (approx. +80°C): 17...20 Ω

Measurement of resistance on electric fuel-injection valve (0 280 150 703/704):
ambient temperature (+15°C...+30°C): 14.5...17.0 Ω
with engine at normal operating temperature (approx. +80°C): 16.5...19.5 Ω

If the reading is too high: there is a break in the valve coil or a valve plug has fallen off. Check the seat on the plug prongs.

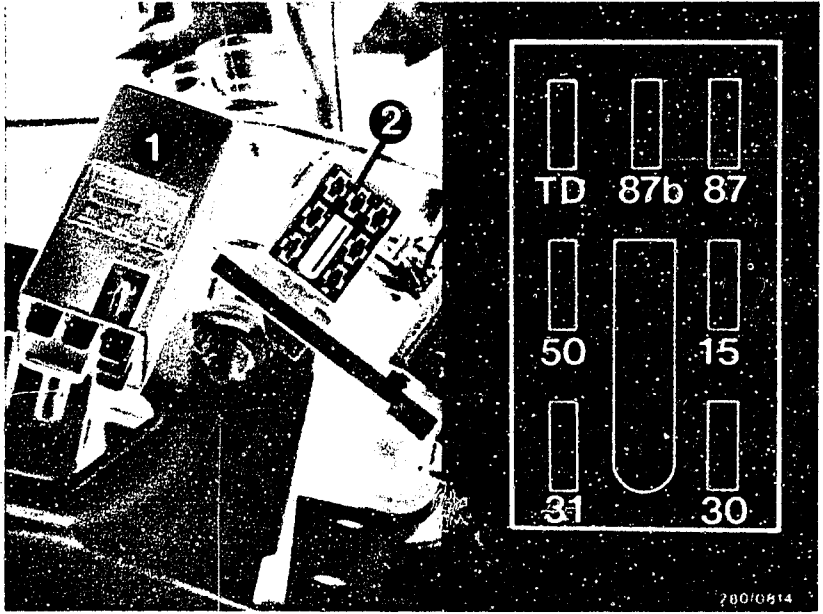
Installation position of the components:

Electric fuel-injection valve: Between the intake manifold and the valve cover.



Top view of control unit plug

- 1 = Control relay
- 2 = Top view of connection socket



D7

Test chart for universal test adapter
BMW 318i, 518i



D8

Test chart for universal test adapter
BMW 318i, 518i



The testing with the universal test adapter has been completed.

The fuel pressure test must now be run.^A
If a defect is found during a test, that test must be repeated after the defect has been corrected.

The fuel pressure test is described at Coordinates D10...D21.

D9

Test chart for universal test adapter
BMW 318i, 518i



FUEL PRESSURE TEST

Is the electric fuel pump running? (Check by listening)

- Is the lead from the ignition coil Term. 1 O.K.?
- Is there voltage at Term. 87b and the electric fuel pump?
- Is the pump fuse O.K.?
- Is the ground lead O.K.?

no

- Checking the control relay
Turn the connection socket around and with the control relay plugged on:
 - Check the lead from Term. 1 to the ignition coil Term. 1 for continuity (approx. 0Ω). Start the engine.
 - If there is no voltage at Term. 87b, take out and replace the control relay.
- Checking the pump fuse
 - Is the pump fuse (fuse box No. 11) O.K.? If not, take it out and replace it. Check the connecting lead.
- Checking the voltage supply to the electric fuel pump.
 - Voltage at the connection terminals for the electric fuel pump is min. 12 V.
 - If not, check the ground lead (ground connection on the left under the rear seat bench).
 - If yes, take out and replace the electric fuel pump.

yes

Is the fuel pressure O.K.?

- Test specification for model for Europe/Sweden/Switzerland: 2.3...2.7 bar
- Test specification for model for US: 2.8...3.2 bar

Is the test specification being met?

no

- Checking fuel pressure
 - Connect pressure gauge or pressure tester. Disconnect hose for the delivery line from the fuel distribution pipe.

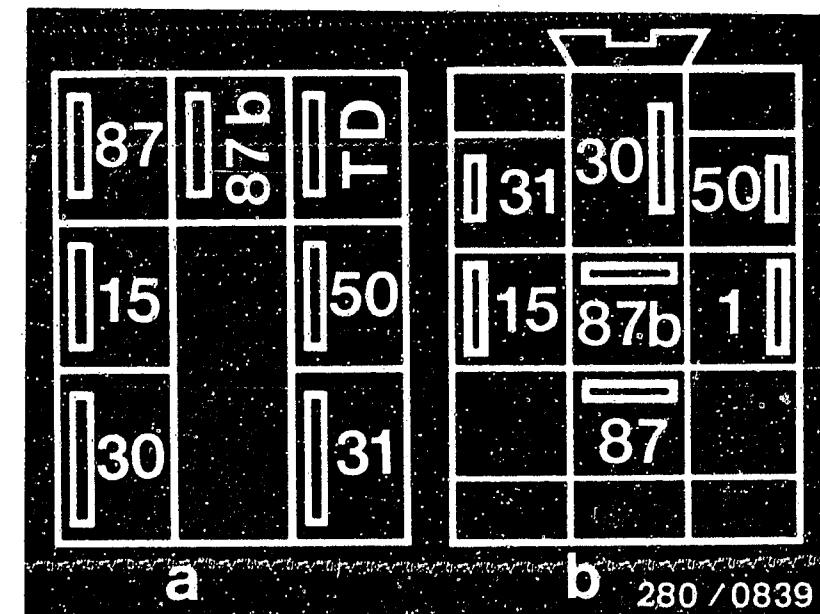
Caution: When disconnecting the fuel hose, make certain that no fuel reaches hot portions of the engine.

 - Connect the pressure gauge.

yes

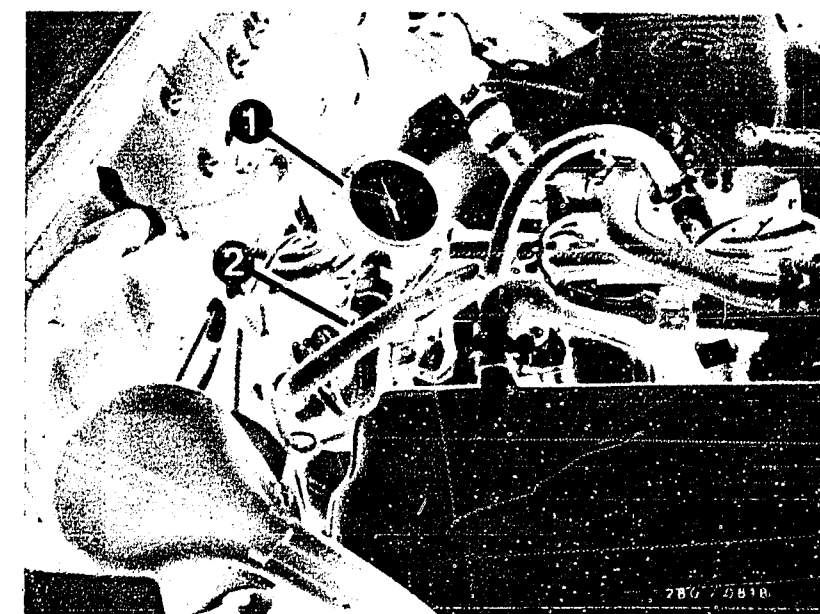
Continued on D14/D15

Continued on D12/D13



Control relay - (Gasoline pump relay)
Connection socket-back
a=Model for EU/S/Switzerland
b=Model for US

1=Pressure gauge
2=Delivery line to the fuel distribution pipe



D 10

Fuel pressure test
BMW 318i, 518i



D 11

Fuel pressure test
BMW 318i, 518i



Fuel pressure test (continued)

- Connect pressure gauge

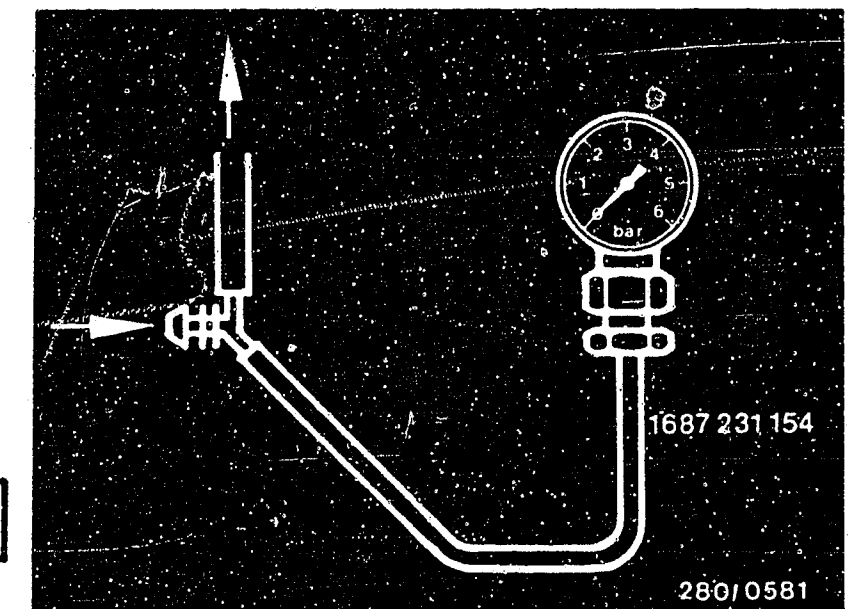
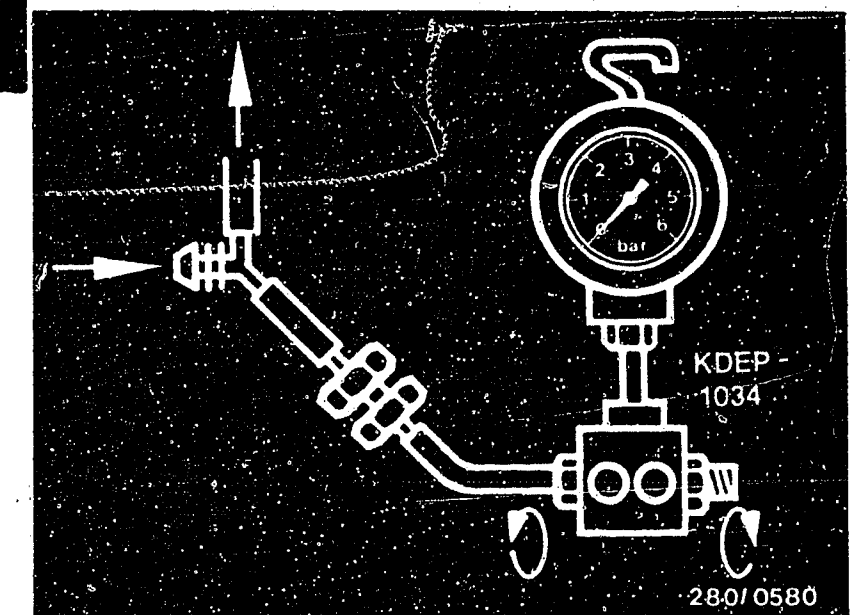
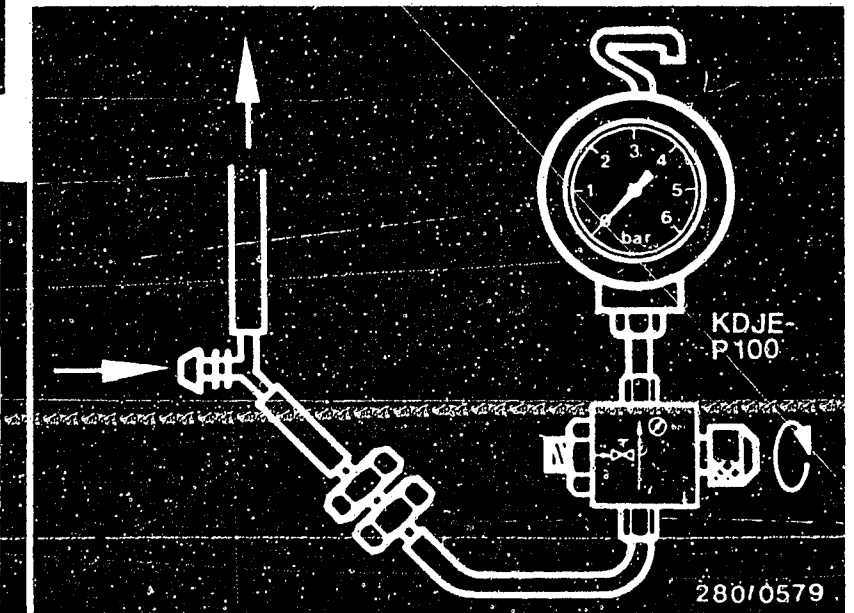
Insert the connections for the pressure tester into the fuel delivery line. When using pressure tester KDJE-P 100, the valve screw must be turned shut. For KDEP 1034, only the valve screw on the right need be. The end of the hose is put on to the fuel distribution pipe and the open connection on the Y-piece is put on the fuel delivery hose.

Make certain the connections do not leak.

yes

Continued on D14/D15

Continued on D14/D15



D12

Fuel pressure test

BMW 318i, 518i



D13

Fuel pressure test

BMW 318i, 518i



Fuel pressure test (continued)

yes

Is the fuel pressure O.K.?
Is the pressure regulator O.K.?

Test specification for the model for EU/S/Switzerland:

2.3...2.7 bar

Test specification for model for US:

2.8...3.2 bar

Is this test specification being met?

no

Checking the pressure regulator

- Jump the safety circuit. Disconnect the control relay, insert a jumper cable between Term. 87b and Term. 30 in the connection socket. The electric fuel pump must run.

Fuel pressure

Test specification for model for EU/S/Switzerland: 2.3...2.7 bar

Test specification for model for US: 2.8...3.2 bar

N. B:!

Remove the jumper cable and plug in the control relay.

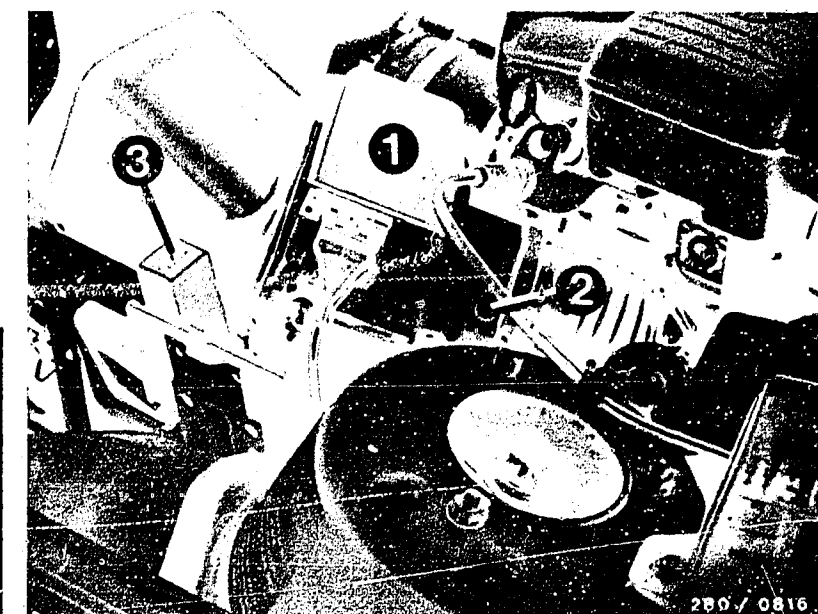
Run the engine at idle → fuel pressure approx. 2.0 bar (Model for EU/S/Switzerland)

approx. 2.5 bar (Model for US)

yes

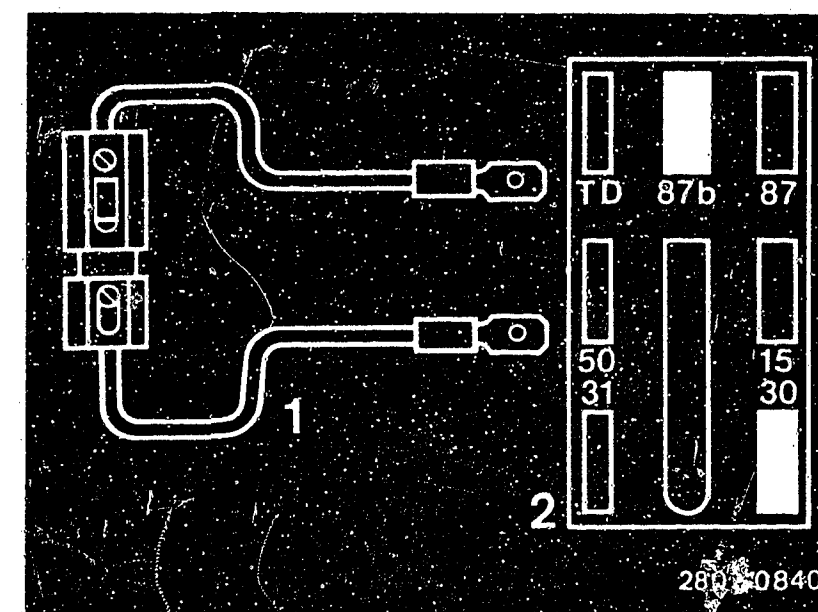
Continued on D20/D21

Continued on D16/D17



3=Control relay (gasoline pump relay) with cover removed

1=Jumper cable with fuse holder and 10A fuse (user-fabricated)
2=Top view of connection socket (US model similar)



D14

Fuel pressure test

BMW 318i, 518i



D15

Fuel pressure test

BMW 318i, 518i



Fuel pressure test (continued)

If the fuel pressure is less than 2.3 or 2.8 bar respectively:

- Disconnect the control relay and insert jumper cable between Term. 87b and Term. 30 in the connection socket. The electric fuel pump must run.

Fuel pressure:

Model for EU/S/Switzerland: 2.3...2.7 bar

Model for US: 2.8...3.2 bar

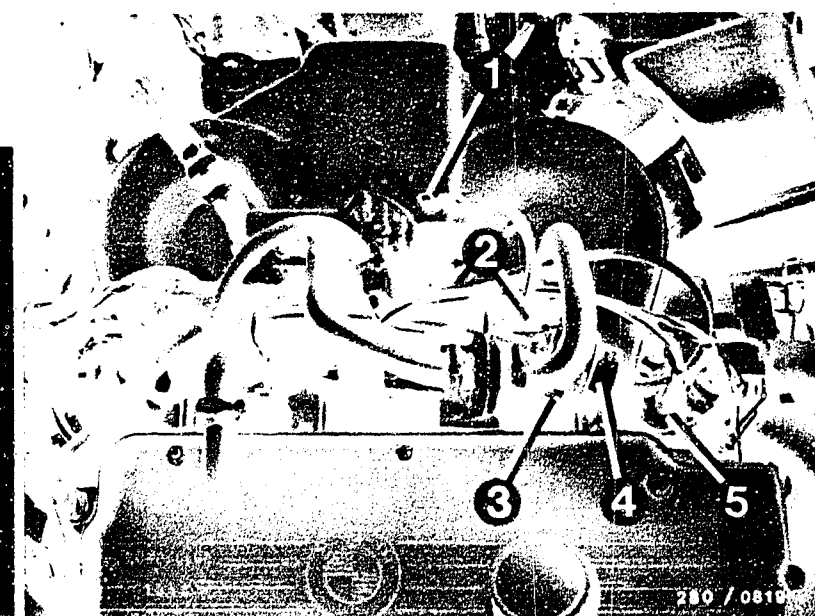
- Slowly crimp off the fuel return line:
(N. B.: Do not load pressure gauge beyond 6 bar!)

If the pressure rises above 4 bar, take out and replace the pressure regulator. The fuel pressure regulator is fastened to the fuel distribution pipe using two fastening screws and an O-ring. After the pressure regulator has been taken out, the O-ring and the flat ring must be taken out and replaced. (Use set of parts 1 287 010 704.)

yes

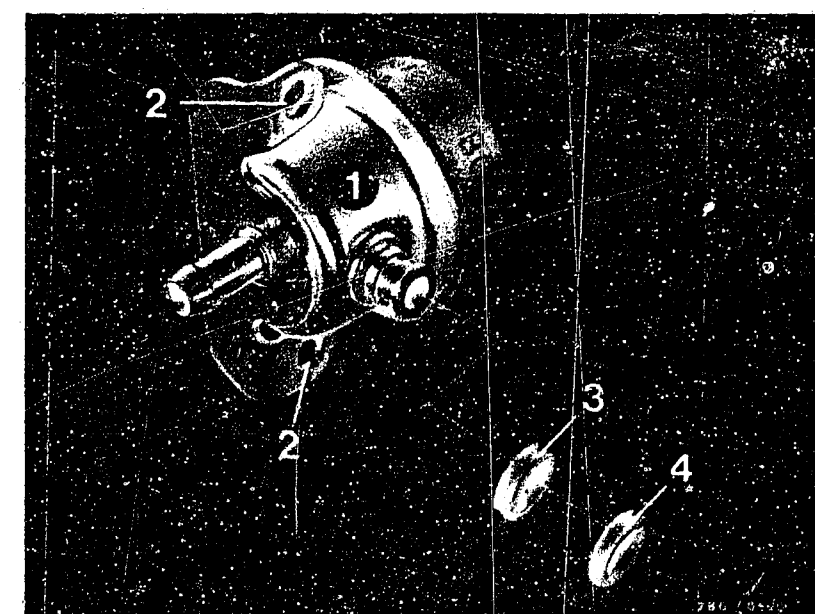
Continued on D20/D21

Continued on D18/D19



2=Fuel return line
3=Fastening screws
4=Pressure regulator
(US model similar)

1=Pressure regulator
2=Fastening holes
3=Flat ring
4=O-ring



D 16

Fuel pressure test
BMW 318i, 518i



D 17

Fuel pressure test
BMW 318i, 518i



Fuel pressure test (continued)

- Check the fuel delivery line and filter for open passage.
- The fuel-line-pressure damper is clogged
- The filter in the tank is clogged
- Corrosion in the tank.

If the fuel pressure exceeds 2.7 bar or 3.2 bar respectively:

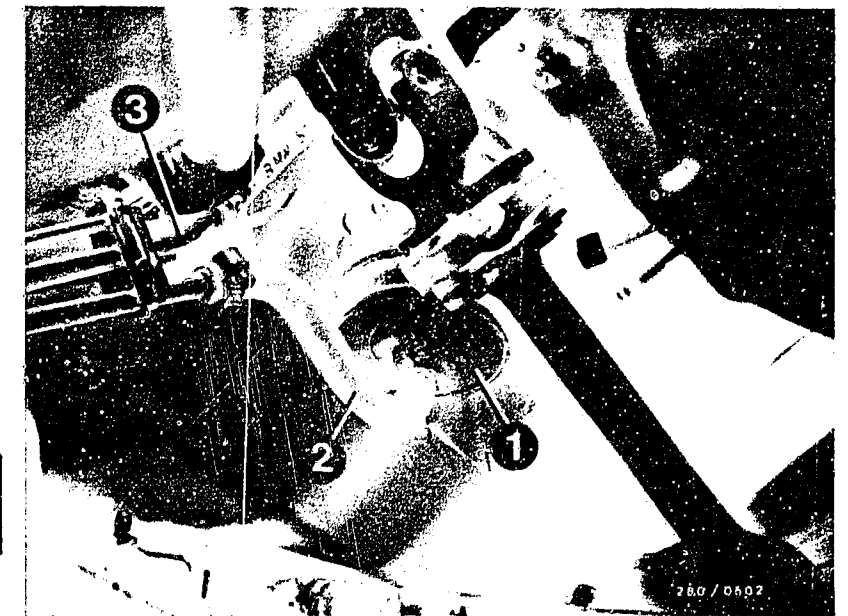
- The fuel return line is clogged or crimped off.
- The fuel-line-pressure damper is clogged.
- Take out and replace the pressure regulator.

N. B.!

It is absolutely necessary to remove the jumper cable after the completion of the testing and to plug the control relay back on.

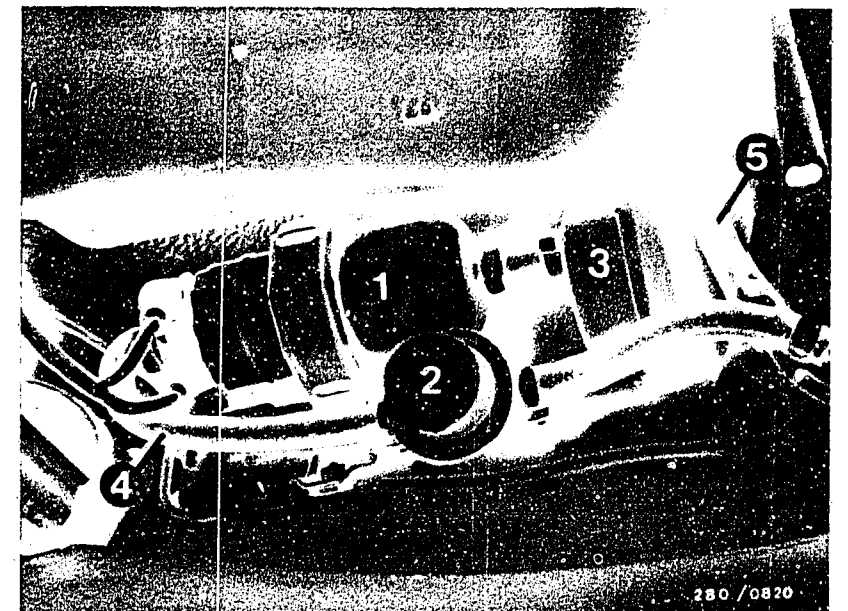
yes

Continued on D20/D21



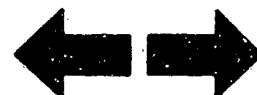
1=Fuel filter
2=Fuel delivery line
3=Fuel return line

1=Electric fuel pump
2=Fuel-line-pressure damper
3=Fuel spinner
4=Fuel delivery line
5=Fuel return line



D 18

Fuel pressure test
BMW 318i, 518i



D 19

Fuel pressure test
BMW 318i, 518i



Fuel pressure test (continued)

Does the fuel pressure remain almost constant after the engine is shut off?

Test specification for model for EU/S/Switzerland:
2.3...2.7 bar

Test specification for model for US:
2.8...3.2 bar

Is this test specification being met?

no

The fuel pressure drops off quickly after the hot engine is shut off.

- Check the fuel system for leaks:
Model for EU/S/Switzerland
fuel pressure 2.3...2.7 bar

Test specification
for US model: 2.8...3.2 bar

Disconnect the jumper cable and watch the pressure gauge.
After approx. 20 min., the fuel pressure must still be min. 1.0 bar.

If not:

- Check connections between components and fuel hoses and lines for leaks.
- Pressure regulator (diaphragm)
- Electric fuel-injection valves (needle seat, the valve is not closing correctly.)
- Electric fuel pump (non-return valve leaking)
- Fuel-line-pressure damper or fuel filter leaking.

yes

Take out the pressure gauge. Restore the connection between the fuel delivery lines and the fuel distribution pipe.

Remove the jumper cable and plug the control relay into the connection socket.

The fuel pressure test has been completed.

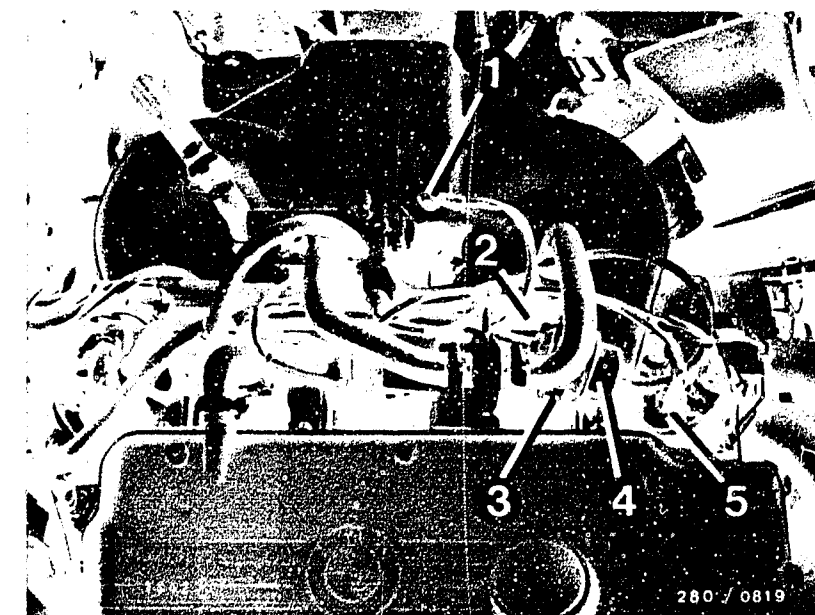
If the defect has not been located, or if additional instructions are required to correct the defect, proceed in accordance with the trouble-shooting chart that you have selected.

Detailed trouble-shooting chart

(Coordinates C3...C4)

Targeted trouble-shooting chart

(Coordinates C5...C8)



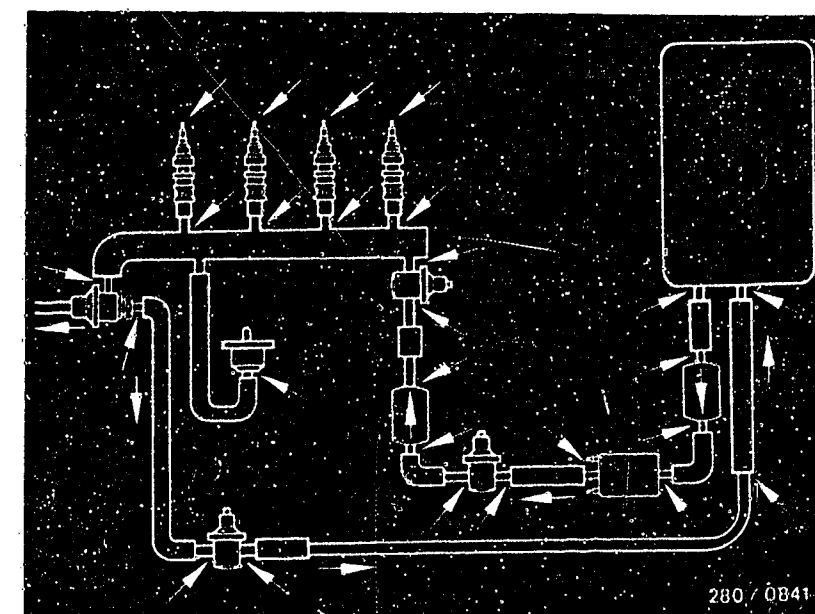
2=Fuel return line

3=Fastening screws

4=Pressure regulator

Fuel line diagram

The arrows show connections between the hoses and components.



D20

Fuel pressure test

BMW 318i, 518i



D21

Fuel pressure test

BMW 318i, 518i



STARTING MOTOR TURNS, ENGINE DOES NOT START OR STARTS ONLY WITH DIFFICULTY

Trouble-shooting program according to customer complaint

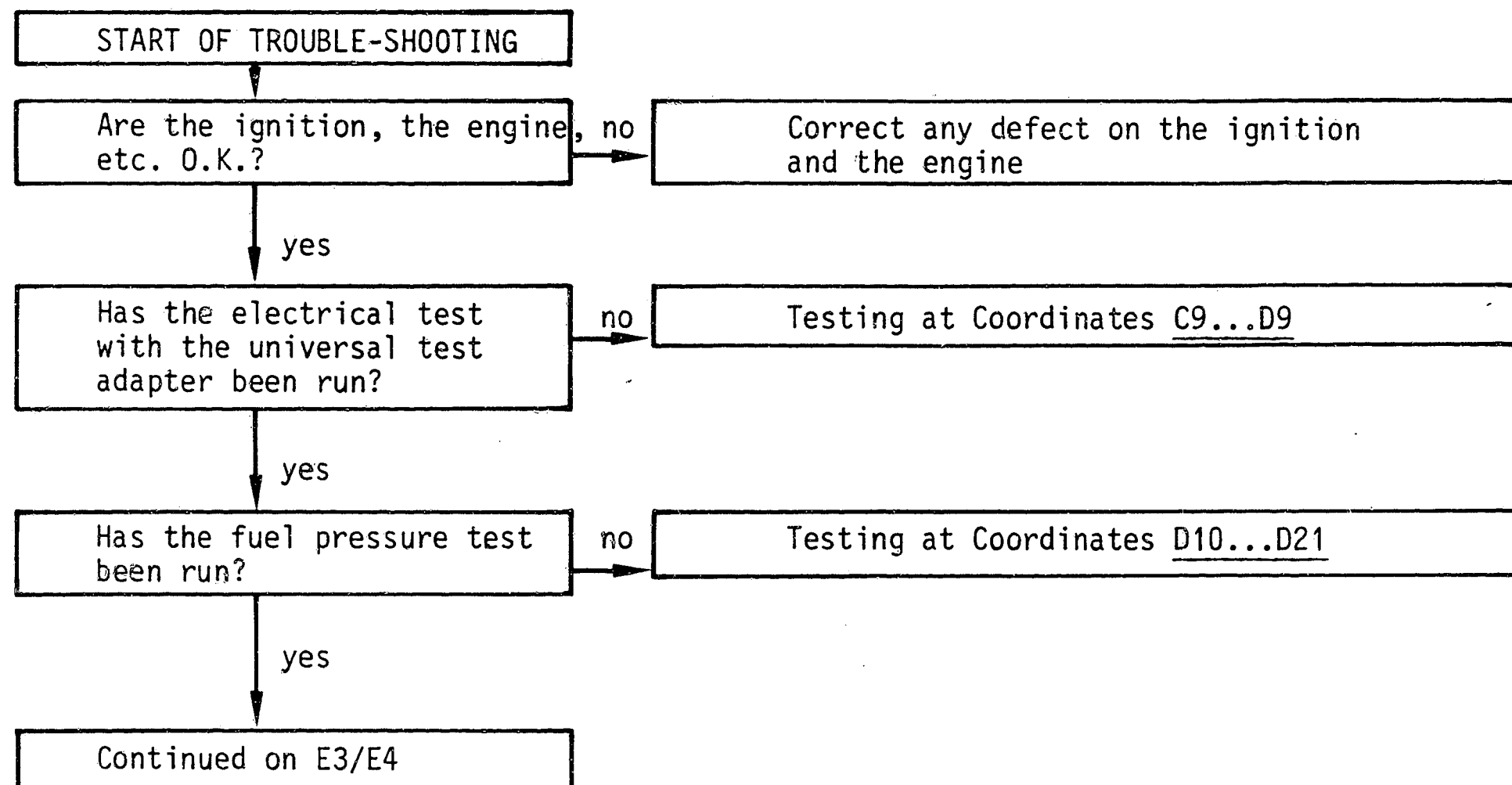
How to use the trouble-shooting program

Testing has been organized into 3 columns of boxes:

- The column at the left contains the questions for the tests being run.
- The column at the center describes the component tests and settings.
- The column at the right shows the figures belonging to the text and the legend for those figures.

If the questions can be answered clearly with "yes" even before testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no" and a defect is suspected, you must shift to the column of boxes at the center and run the tests indicated there. On completion of the testing, the trouble-shooting is continued at that point at which the shift was made.



E1

Starting motor turns, engine does not start
BMW 318i, 518i



E2

Starting motor turns, engine does not start
BMW 318, 518i



Starting motor turns, engine does not start or starts only with difficulty (continued)

yes

Check the electric starting valve

- O.K. electrically?
- Is the electric starting valve free of leaks?

no

Functional test:

Check the voltage supply to the electric starting valve during start. To do so, disconnect the plug from the electric starting valve and connect a voltmeter to Term. 30 and Term. 29/Term. 4 of the electric starting valve plug.

1. Coolant at ambient temperature (+15°C... +30°C):

Voltage reading min. 6 V.

2. Coolant temperature at normal engine operating temperature (approx. +80°C):

Voltage reading approx. 0 V.

Check the following leads for continuity using an ohmmeter.

(specified value: approx. 0 Ω):

- Lead from Term. 30 on the electric starting valve to thermotime switch Term. "W"
- Lead from Term. 29 on the electric starting valve to thermotime switch Term. "G".
- Lead from Term. 4 on the control unit to the control relay Term. 50.

Check the ground connection for the thermotime switch.

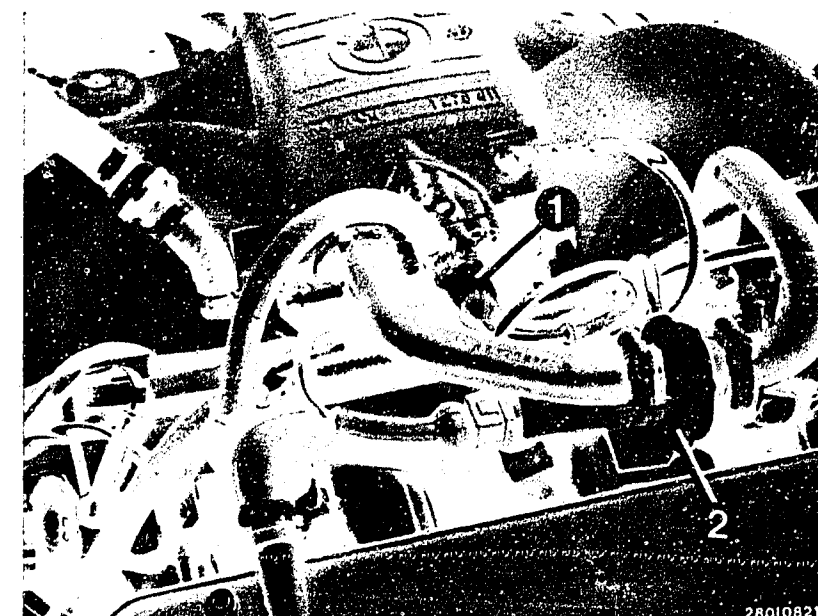
Check the electric starting valve electrically:

Connect an ohmmeter to the electric starting valve Term. 29 and Term. 30. Specified value: approx. 4 Ω .

yes

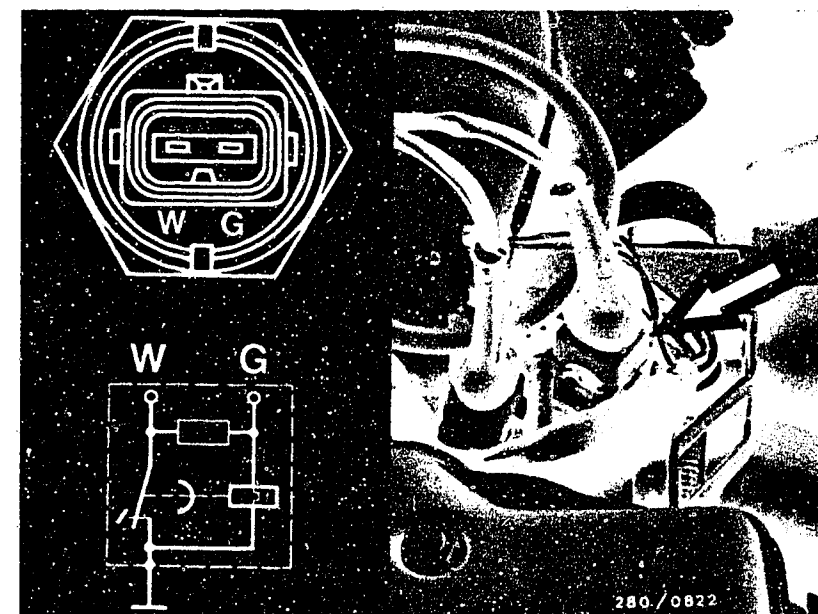
Continued on E9/E10

Continued on E5/E6



1=Electric starting valve (blue plug)

Arrow=Thermotime switch (brown plug)



E3

Starting motor turns, engine does not start

BMW 318i, 518i



E4

Starting motor turns, engine does not start

BMW 318i, 518i



Starting motor turns, engine does not start or starts only with difficulty (continued)

Check the electric starting valve mechanically: Remove the electric starting valve from the intake manifold and hold it into a container. (Caution: Fire hazard!) When starting and at an ambient temperature (+15°C...+30°C), the electric starting valve must open (max. 8 sec.). With the engine at normal operating temperature (+80°C), it is not permissible for the electric starting valve to open. With the ignition switched on and the pressure built up, it is likewise not permissible for the electric starting valve to open. Run the opening test with the engine at normal operating temperature (+80°C) as follows: Disconnect the plug on the thermotime switch and connect Term. "W" to ground. Start the engine.

Check the electric starting valve for leaks:

1. In the engine:

Clamp off the fuel delivery line at the electric starting valve. If the engine then runs smoothly, take out and replace the electric starting valve.

2. Taken out of the vehicle:

Take out the electric starting valve. (Caution: Fire hazard!) The fuel and the electrical lines remain connected. (Place a catch basin under the electric valve!) Build up the fuel pressure (disconnect the control relay, insert a jumper cable between Term. 87b and Term. 30 in the connection socket.)

Test specification: It is permissible for a maximum of one drop to form within one minute at the valve opening.

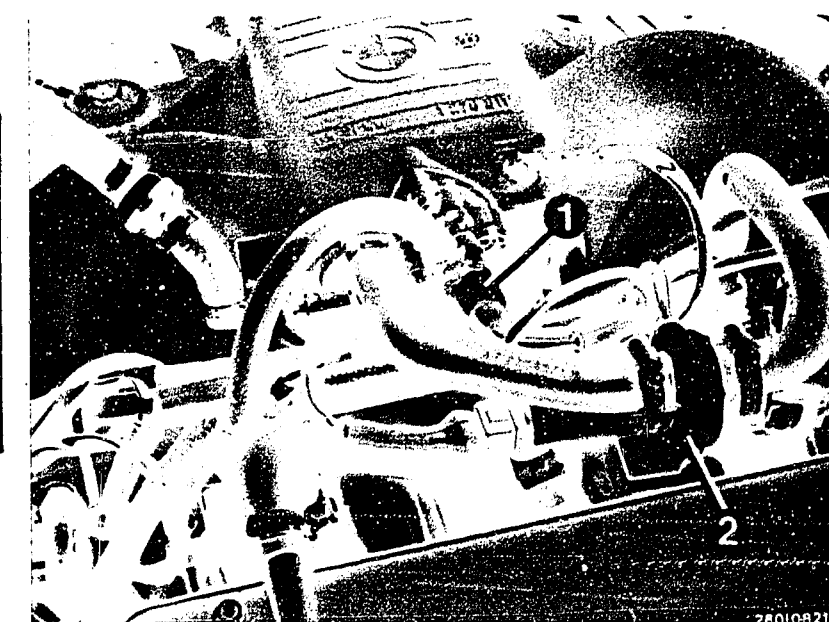
Caution!

Be absolutely certain to remove the jumper after completion of the test and to plug the control relay back on.

yes

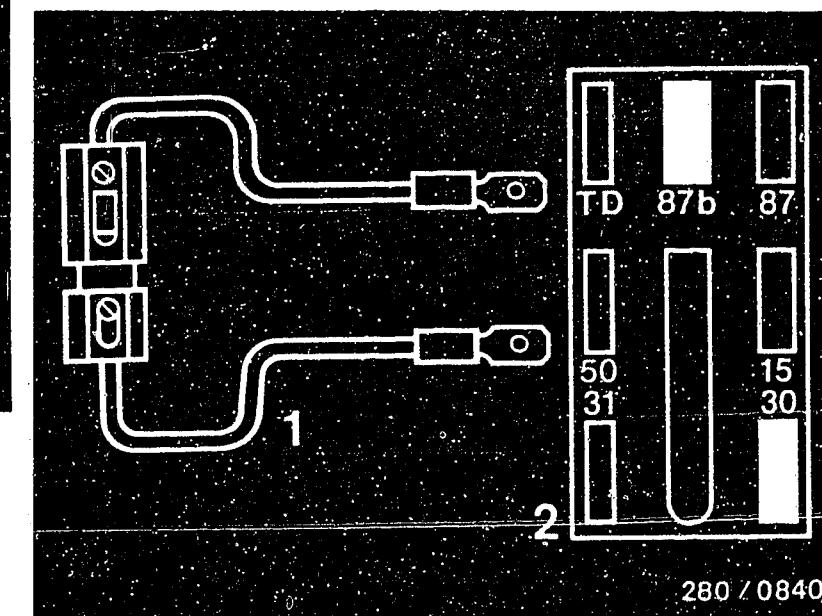
Continued on E9/E10

Continued on E7/E8



1=Electric starting valve (blue plug)

1=Jumper cable with fuse holder and 10A fuse (user-fabricated)
2=Top view of connection socket (US model similar)



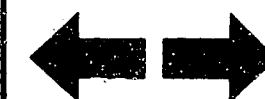
E5

Starting motor turns, engine does not start
BMW 318i, 518i



E6

Starting motor turns, engine does not start
BMW 318i, 518i



Starting motor turns, engine does not start or starts only with difficulty (continued)

Is the thermotime switch O.K.?

no

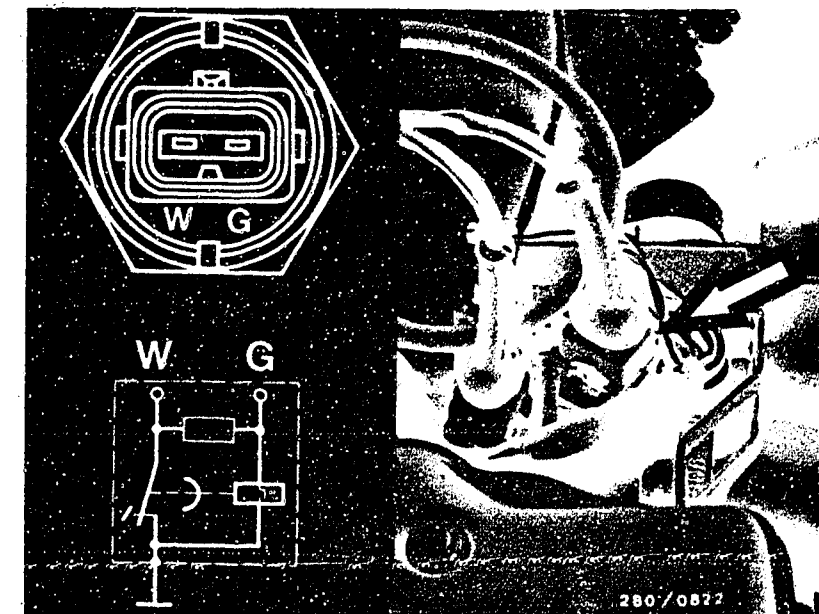
Electrical test:

Check the thermotime switch 35°C/8 sec. as follows: Disconnect the plug and take measurements directly on the thermotime switch using an ohmmeter.

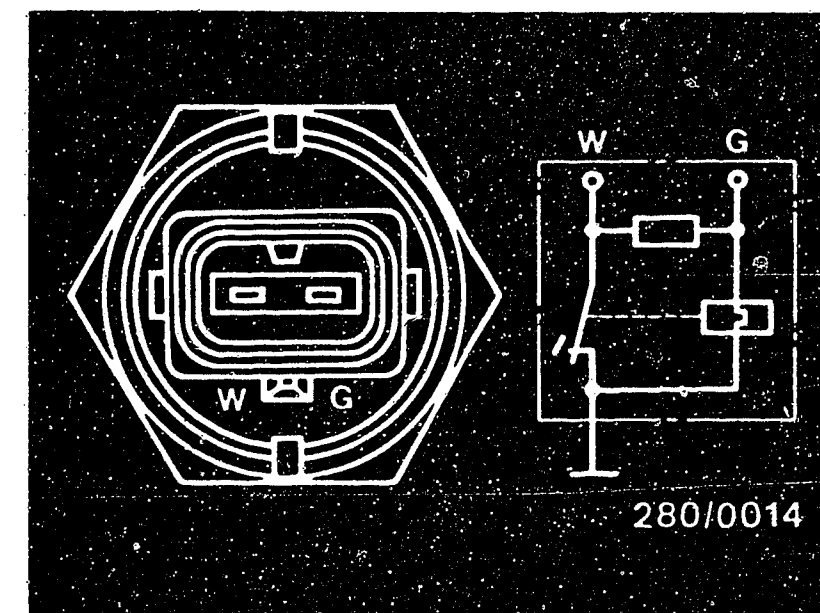
1. Between Term. "G" and ground at ambient temperature (less than +30°C): 25...40 Ω
with engine at normal operating temp. (above +40°C): 50...80 Ω
2. Between Term. "W" and ground at ambient temperature (less than +30°C): 0 Ω
with engine at normal operating temp. (above +40°C): 100...160 Ω
3. Between Term. "G" and "W" at ambient temperature (less than +30°C): 25...40 Ω
with engine at normal operating temp. (above +40°C): 50...80 Ω

yes

Continued on E9/E10



Arrow=Thermotime switch (brown plug)



E7

Starting motor turns, engine does not start
BMW 318i, 518i



E8

Starting motor turns, engine does not start
BMW 318i, 518i



Starting motor turns, engine does not start or starts only with difficulty (continued)

yes

Is the auxiliary-air device O.K. mechanically? (not used in the US model)
Open passage:
• cold → open?
• warm → closed?
• Does the engine speed drop when the hose is clamped off? (cold engine).

no

Testing:

- Visual inspection of the auxiliary-air device. Disconnect the hoses and look through. (If necessary, use a small mirror to do so.) When cold, the cross-section must be partially open, when warm it must be closed. If not, take out and replace the auxiliary-air device.
- Functional test of the auxiliary-air device: With the engine cold, clamp off the hose to the auxiliary-air device. The engine speed must drop off. With the engine warm, clamp off the hose to the auxiliary-air device. The engine speed must not drop off noticeably. Otherwise, take out and replace the auxiliary-air device. (Watch the direction of through flow.)

yes

Is the electrical operation of the auxiliary-air device (voltage supply, ground lead, resistance value) O.K.? (not used in the US model)

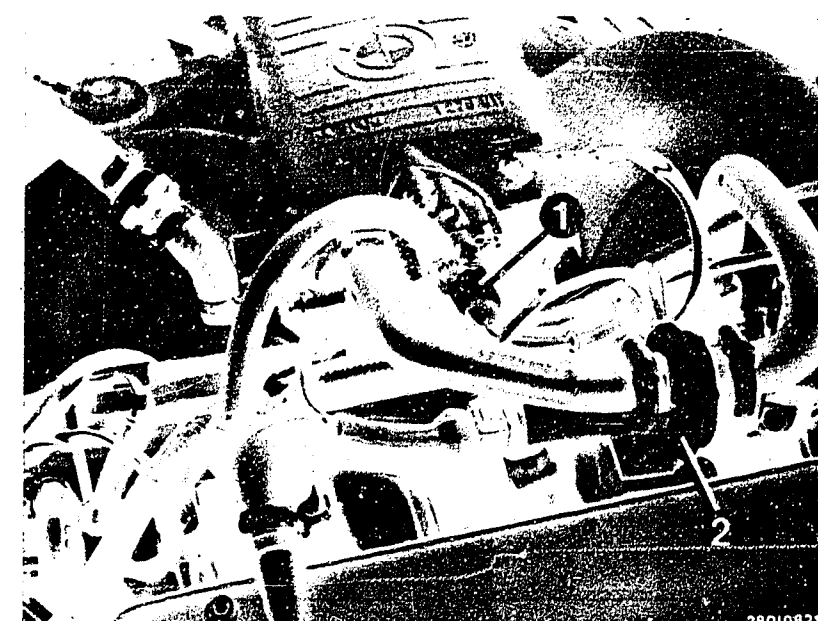
no

Start the engine.

- Voltage at the lead plug min. 12 V. If not, check the following leads for continuity (specified value approx. 0 Ω).
- From Term. 26 to the ground terminal output stage
- From Term. 9/2 to the control unit plug Term. 9.
- Resistance of the auxiliary-air device 30...65 Ω (lead plug disconnected). If the resistance is not within tolerance, take out and replace the auxiliary-air device.

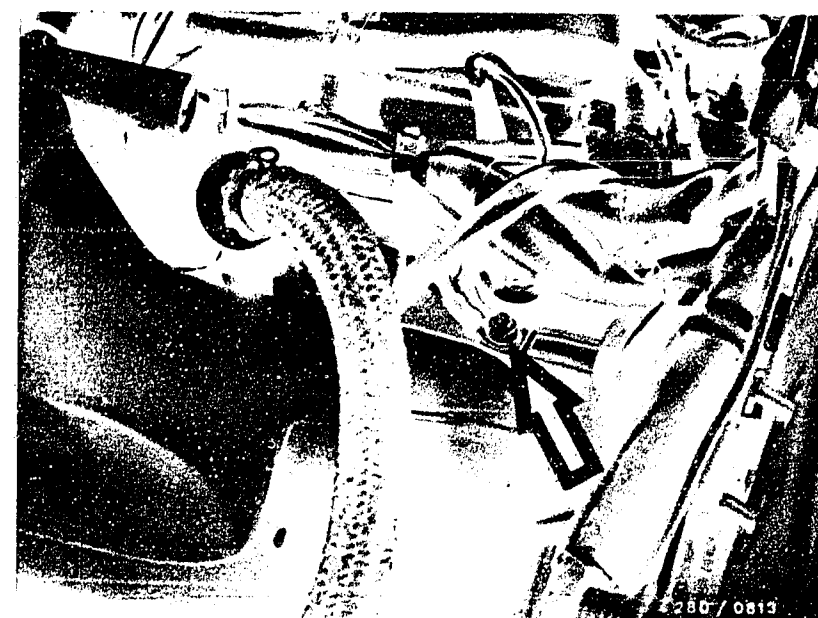
yes

Continued on E11/E12



2=Auxiliary-air device

Arrow=Ground terminal, output stage



E9

Starting motor turns, engine does not start
BMW 318i, 518i



E10

Starting motor turns, engine does not start
BMW 318i, 518i



Starting motor turns, engine does not start or starts only with difficulty (continued)

yes

Is the air-flow sensor mechanically and electrically O.K.?

Is the resistance within tolerance?

Between Term. 8 and Term. 9:
160 ... 300 Ω

Between Term. 7 and Term. 5
(deflect air-flow sensor flap):
60 ... 1000 Ω

no

Testing:

Release the clamps on the air filter.

Lift off the upper portion of the air filter.

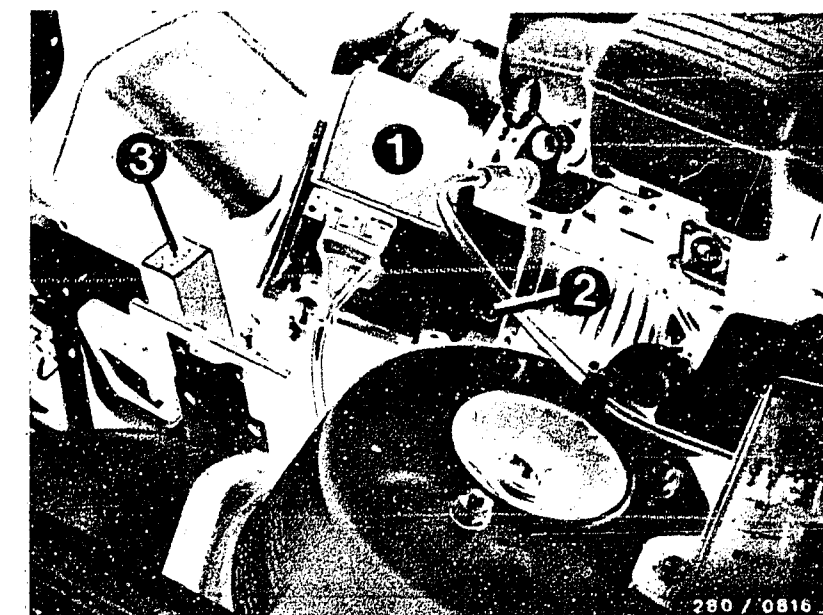
- Check the air-sensor flap for easy movement. Open the air-flow sensor flap manually. It must be uniformly easy to open the air-flow sensor flap as far as the stop, and the flap must then close again as far as the stop by itself. The air-flow sensor flap must not stick when opening.
- Check the air-flow sensor mechanically. Watch for signs of grinding. If the air-flow sensor is very dirty inside, clean it and rub it out with a lint-free cloth. If there are signs of grinding, the air-flow sensor must be taken out and replaced. The air-flow sensor flap must return to the at rest position. If not, the stopper or the air-flow sensor flap is bent out of shape. The air-flow sensor must be taken out and replaced.
- Check resistances
Connect an ohmmeter to Term. 8 and Term. 9 on the air-flow sensor.
Test specification: 160...300 Ω
Connect an ohmmeter to Term. 7 and Term. 5 of the air-flow sensor.
Deflect the air-flow sensor flap.
Test specification: 60...1000 Ω

N. B.!

On completion of the test, the air filter and the air-flow sensor must be put back together.

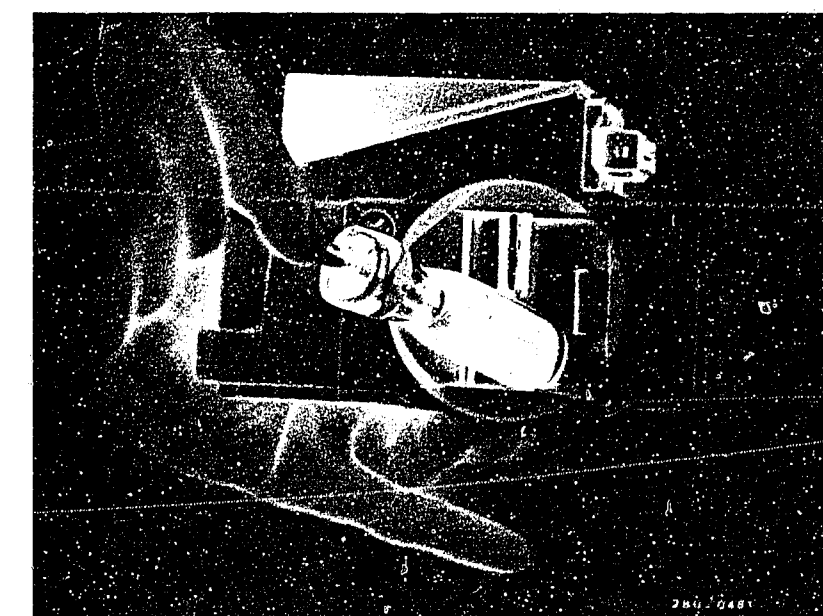
yes

Continued on E13/E14



1=Air-flow sensor
2=CO-adjusting screw

Pressing on the sensor flap in the air-flow sensor



E11

Starting motor turns, engine does not start
BMW 318i, 518i



E12

Starting motor turns, engine does not start
BMW 318i, 518i



Starting motor turns, engine does not start or starts only with difficulty (continued)

yes

Does the engine start well
when hot?
Is the hot start O.K.?

no

Check the fuel system for leaks:

Run the engine until hot. Insert a pressure gauge into the fuel delivery line at the distribution pipe. Disconnect the control relay. Plug a jumper cable between Term. 87b and Term. 30 in the connection socket. The electric fuel pump must run.

Model for EU/S/Switzerland:

Fuel pump pressure 2.3...2.7 bar

Model for US:

Fuel pump pressure 2.8...3.2 bar

Disconnect the jumper cable and watch the pressure gauge. After approx. 20 min., the fuel pressure must still be at least 1 bar.

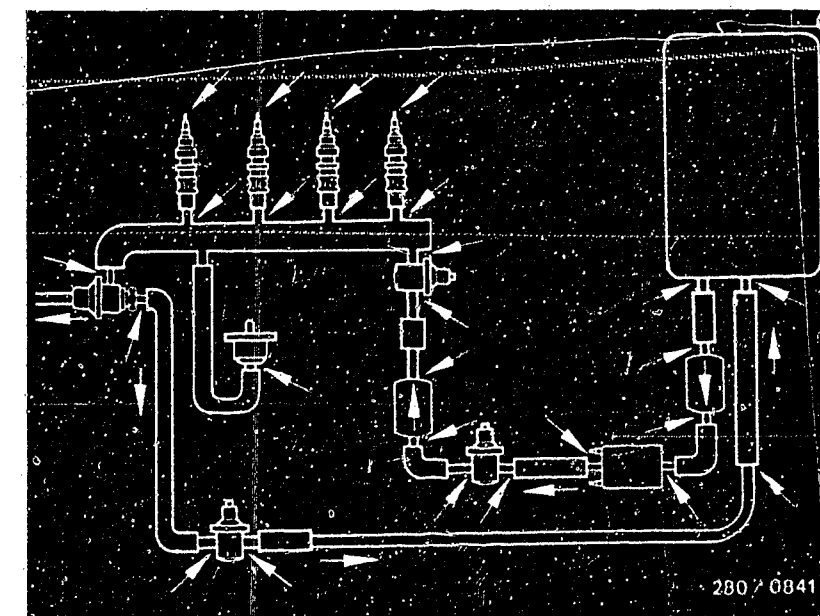
If not:

- Check the location of connections between the components and the fuel hoses and lines for leaks. (Arrows in the Figure).
- The non-return valve in the electric fuel pump is defective.

After testing, take out the pressure gauge. Restore the connection between the fuel delivery line and the fuel distribution pipe. Plug the control relay back on.

yes

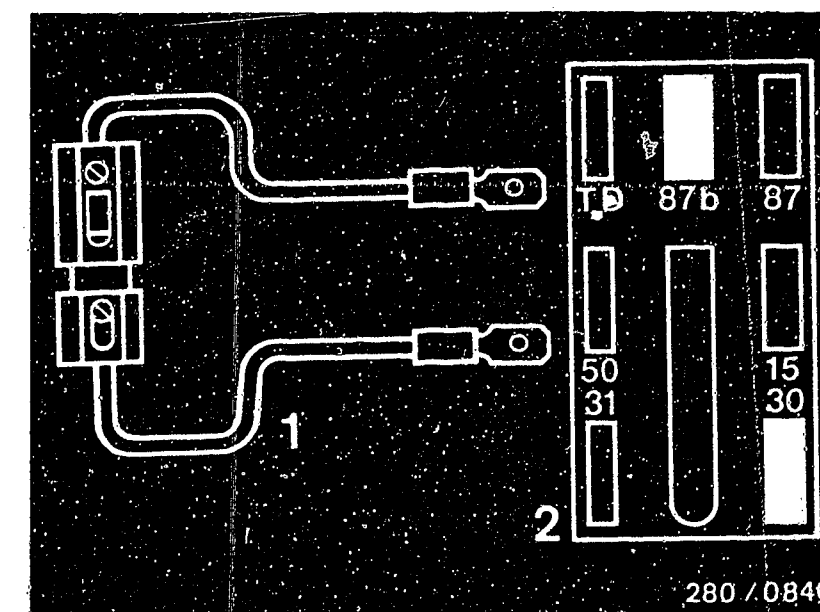
Continued on E15/E16



Fuel line diagram

Arrows show locations of connections between hoses and components.

1=Jumper cable with fuse holder and 10A fuse
2=Top view of connection socket (US model similar)



E13

Starting motor turns, engine does not start
BMW 318i, 518i



E14

Starting motor turns, engine does not start
BMW 318i, 518i



Starting motor turns, engine does not start or starts only with difficulty (continued)

yes

No engine coughing during the starting process? (Only model for EU/S/Switzerland)

no

yes

Continued on E17/E18

Check the CO-adjustment:

1. Model for Europe

With engine at normal operating temperature:
less than 1.0 vol. %CO

1. Model for Sweden/Switzerland:

0.2 ... 0.4 vol. %CO

(Hose on the air valves).

Setting in case of defect:

Idle speed: 800...900 min⁻¹

CO-adjustment: 0.3...1.0 vol.%CO

with the air valve hose taken off and plugged.

N. B.! Start without moving the accelerator

pedal. When checking or adjusting the idle and

CO, eliminate the effect of the secondary-air

induction. To do this, disconnect the hose be-

tween the air valve and the air filter at the air

filter, and seal it tight with a plug. When

operating vehicle in countries without stricter

exhaust gas regulations, it is not necessary to

inactivate the secondary air induction system.

All vehicles:

If the CO-component is too low, adjust the by-

pass screw (CO-adjusting screw) in the air-flow

sensor clockwise by one half turn. (Socket hex

screw, AF 5). Recheck the idle speed and CO-com-

ponent. If need be, make corrections in several

steps.

After adjustment, use a new (red) plug (1 280

508 012).

Has the defect been corrected? If not, put in a

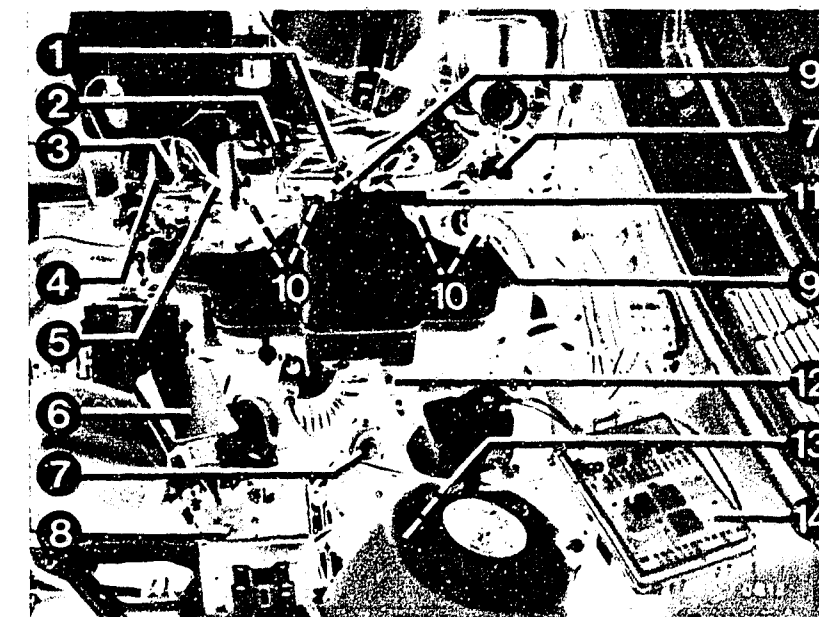
resistor (R=500...800 Ω) in lead No. 10 to the

NTC II. However, this resistor operates only

during the starting process (enrichment of the

mixture). For wiring in the vehicle, see the

wiring diagram at the right.



1=CO-adjusting screw

2=Idle-speed adjusting screw

1=Multiple plug

2=Ground terminal, electronic system

3=Temperature sensor II

4=Resistor, 500...800 Ω 0.3 W

5=Relay (e.g., 0 332 204 150)

lead 0.75 mm²

E15

Starting motor turns, engine does not start

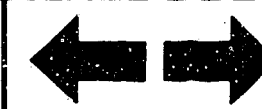
BMW 318i, 518i



E16

Starting motor turns, engine does not start

BMW 318i, 518i



Starting motor turns, engine does not start or starts only with difficulty (continued)

yes

Are all hose lines and electrical lead connections put on correctly, without sharp bending or damage?
Visual inspection.
Has the air intake system been checked for leaks at 0.3 bar gauge pressure?

no

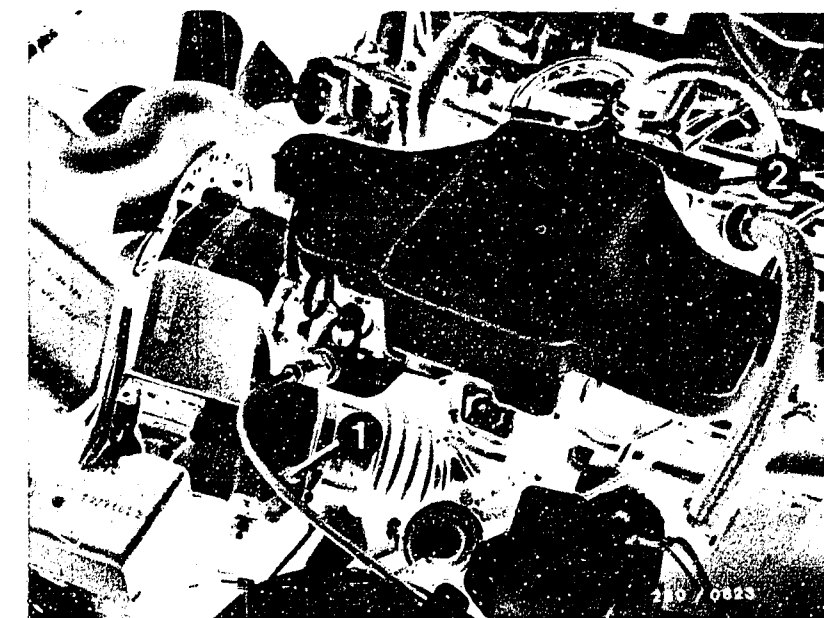
- Check that the hoses of the air-intake system and the fuel line system are put on correctly, without sharp bending or damage. If need be, take out and replace the hoses. Eliminate leaks using new seals or by tightening the connection screws.

• Testing for leaks:

Seal off the exhaust pipe. Release the clamps at the air filter. Lift off the top part of the air filter and seal the air-flow sensor channel. Disconnect the hose after the auxiliary-air device and, using a compressed air gun, blow air (0.3 bar gauge pressure) into the intake manifold. Seal off the auxiliary-air device connection. In so doing, open the throttle valve completely. Using soapy water, spray or brush on all seal locations. Leaks can also occur at the following points on the engine: The oil dipstick has not been inserted firmly, the cover seal for the oil filling pipe is defective, etc.
Bubbling or foaming indicates leaks.

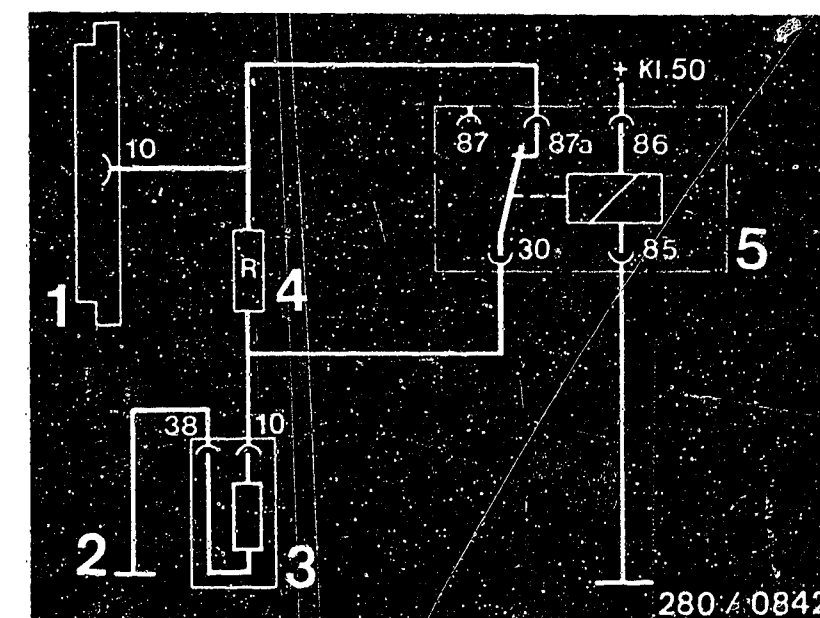
yes

Continued on E19/E20



Model for Europe

- 1=Electric starting valve
- 2=Auxiliary-air device
- 3=NTC II
- 4=Thermotime switch
- 5=Pressure regulator
- 6=Air-flow sensor
- 7=Fuel-line-pressure damper
- 8=Control relay
- 9=Ground terminals
- 10=Electric fuel-injection valves
- 12=Throttle valve switch



E17

Starting motor turns, engine does not start
BMW 318i, 518i



E18

Starting motor turns, engine does not start
BMW 318i, 518i



Starting motor turns, engine does not start or starts only with difficulty (continued)

yes

Model for Sweden/Switzerland:

The secondary air induction system has been installed here as an additional measure to reduce the toxic substances in the exhaust gas.

- Testing for leaks:

In addition, the lines for the secondary air induction system and the air valves must be checked.

Model for the US:

Because of the strict exhaust gas regulations in the USA, a lambda closed-loop control with a 3-bed catalytic convertor must be installed in these engines. In addition, the USA model has an idle actuator instead of the auxiliary-air device, i.e., an idle speed control built by VDO.

- Testing for leaks:

In addition, the hoses for the idle speed control system must be checked.

Other possible defects:

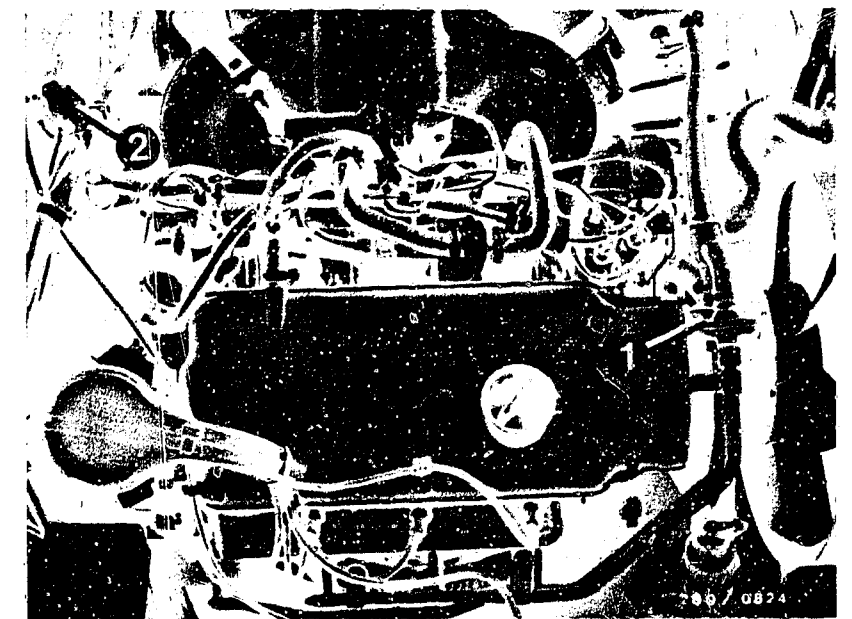
- The customer complaint has been incorrectly identified. (See Coordinates C3...C8).
If the defect has not been identified using the "Targeted trouble-shooting," see "Detailed trouble-shooting." (Coordinates C3/C4).
- The engine is not O.K. mechanically (compression, valve setting, valve timing, wear on camshaft).

Checking of the customer complaint:

"Starting motor turns, engine does not start or starts only with difficulty,"

has been completed.
Has the customer complaint been corrected?

no



Model for Sweden/Switzerland

1=natural aspiration air valves

2=Solenoid-operated valve

Model for US

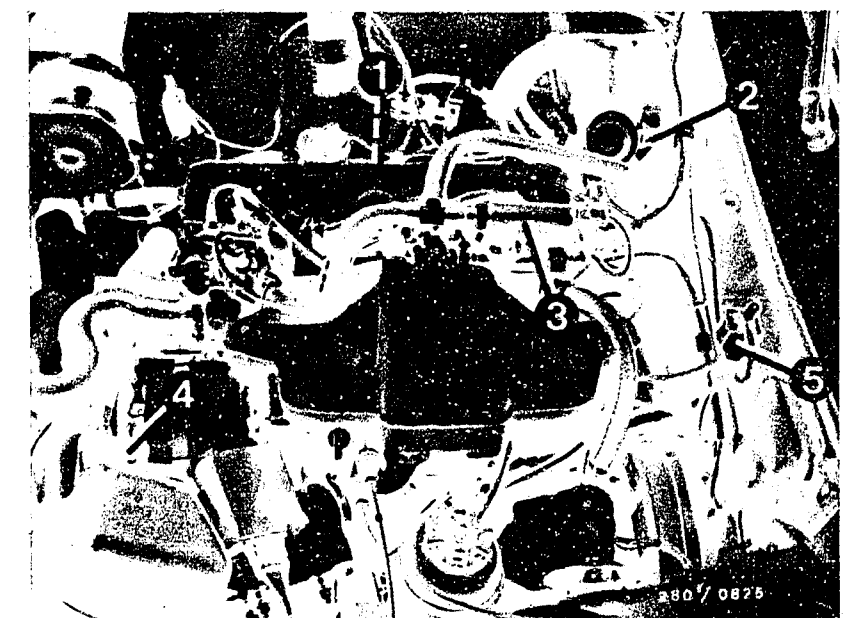
1=Lambda sensor

2=Sensor connection

3=Idle actuator (VDO)

4=Pressure sensor (altitude sensor)

5=Solenoid-operated valve



E19

Starting motor turns, engine does not start

BMW 318i, 518i



E20

Starting motor turns, engine does not start

BMW 318i, 518i



ENGINE STARTS AND THEN DIES

Trouble-shooting program according to customer complaint

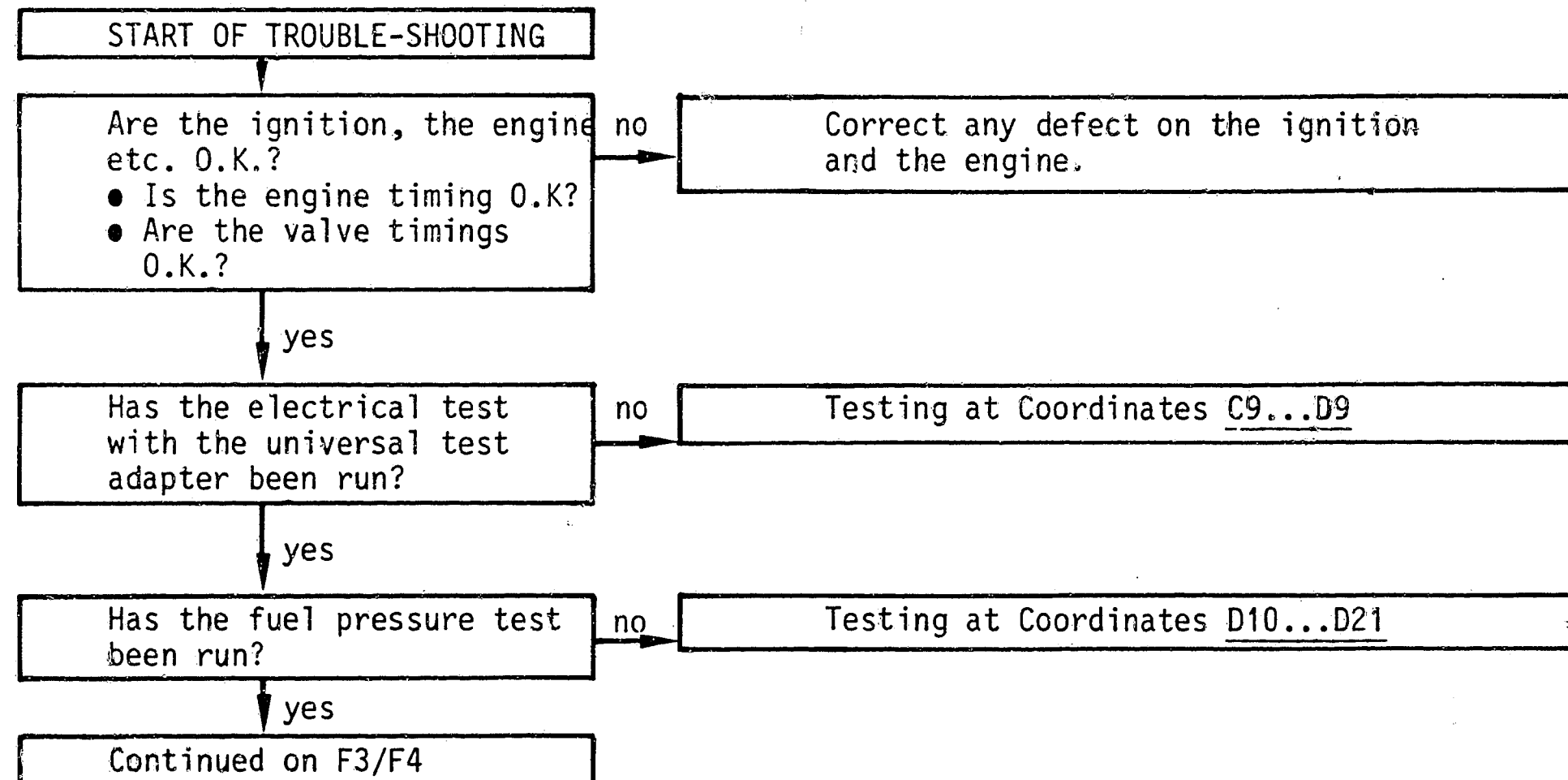
How to use the trouble-shooting program

Testing has been organized into 3 columns of boxes:

- The column at the left contains the questions for the tests being run.
- The column at the center describes the component tests and settings.
- The column at the right shows the figures belonging to the text and the legend for those figures.

If the questions can be answered clearly with "yes" even before testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no" and a defect is suspected, you must shift to the column of boxes at the center and run the tests indicated there. On completion of the testing, the trouble-shooting is continued at that point at which the shift was made.



F1

Engine starts and then dies
BMW 318i, 518i



F2

Engine starts and then dies
BMW 318i, 518i



Engine starts and then dies (continued)

yes

Is the electric starting valve
O.K.?
(Test for leaks)

no

Check the electric starting valve for leaks:

1. In the engine:

Clamp off the fuel delivery line at the electric starting valve. If the engine then runs smoothly, take out and replace the electric starting valve.

2. Taken out of the vehicle:

Take out the electric starting valve. (Caution: Fire hazard!) The fuel and the electrical lines remain connected. (Place a catch basin under the electric starting valve!) Build up the fuel pressure (disconnect the control relay, insert a jumper cable between Term. 87b and Term. 30 in the connection socket.)

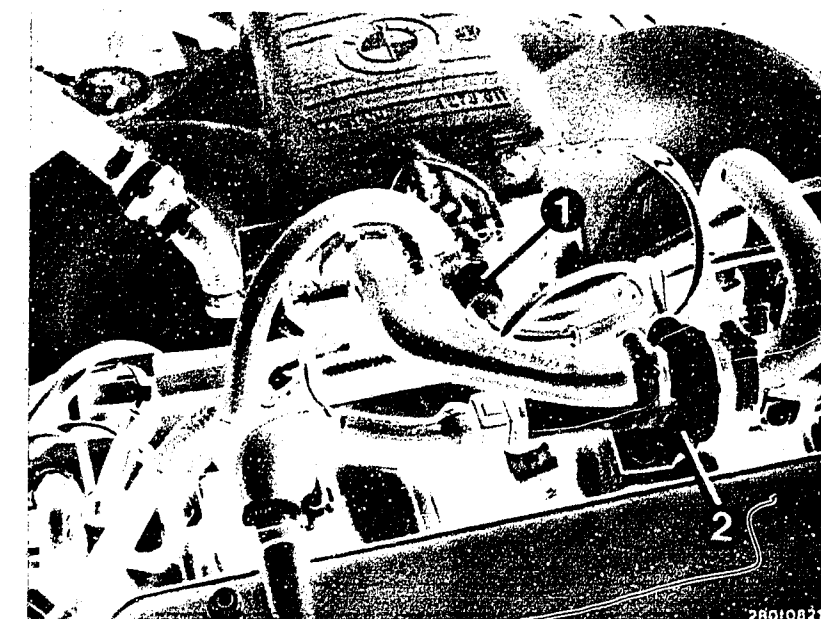
Test specification: It is permissible for a maximum of one drop to form within one minute at the valve opening.

Caution!

Be absolutely certain to remove the jumper after completion of the test and to plug the control relay back on.

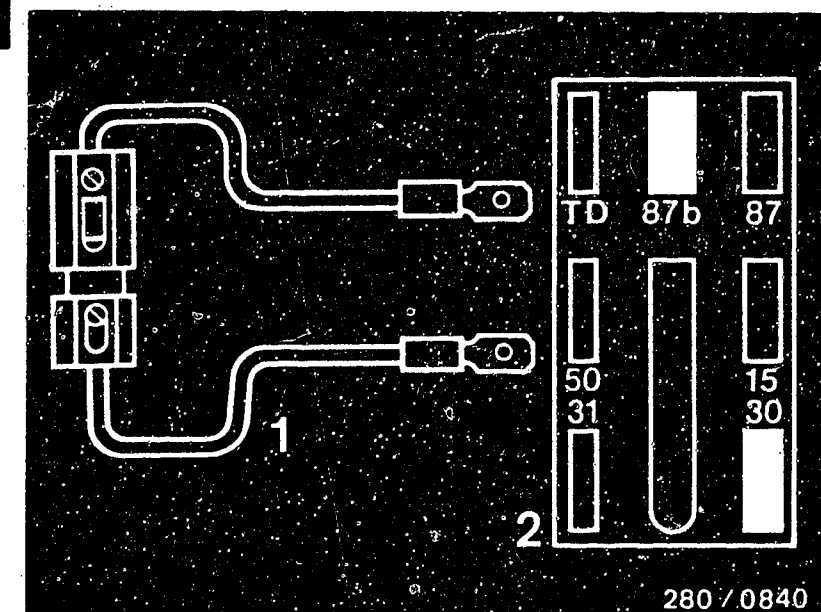
yes

Continued on F5/F6



1=Electric starting valve
(blue plug)

Jumper cable (user-fabricated)
1=Fuse holder with 10A fuse
2=Top view of connection socket



F3

Engine starts and then dies
BMW 318i, 518i

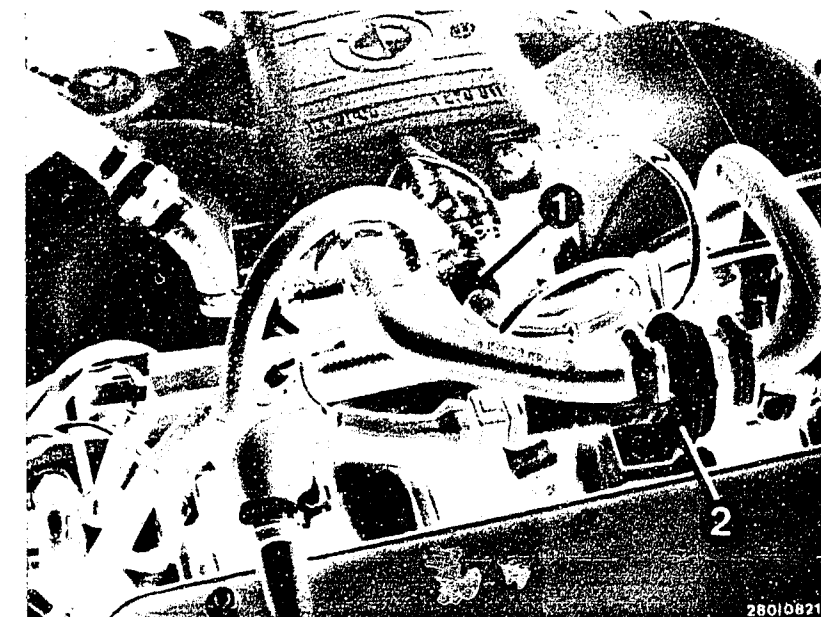
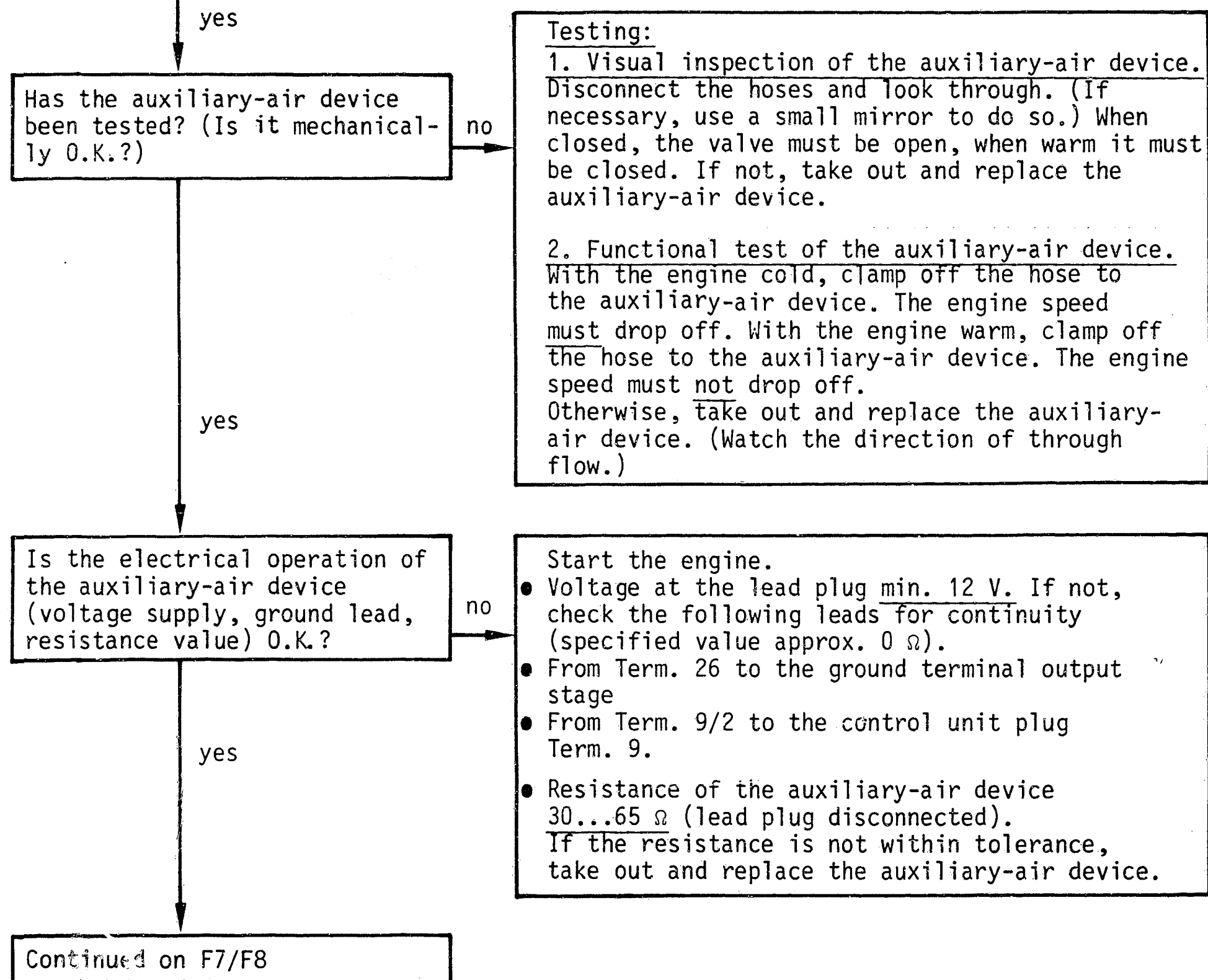


F4

Engine starts and then dies
BMW 318i, 518i

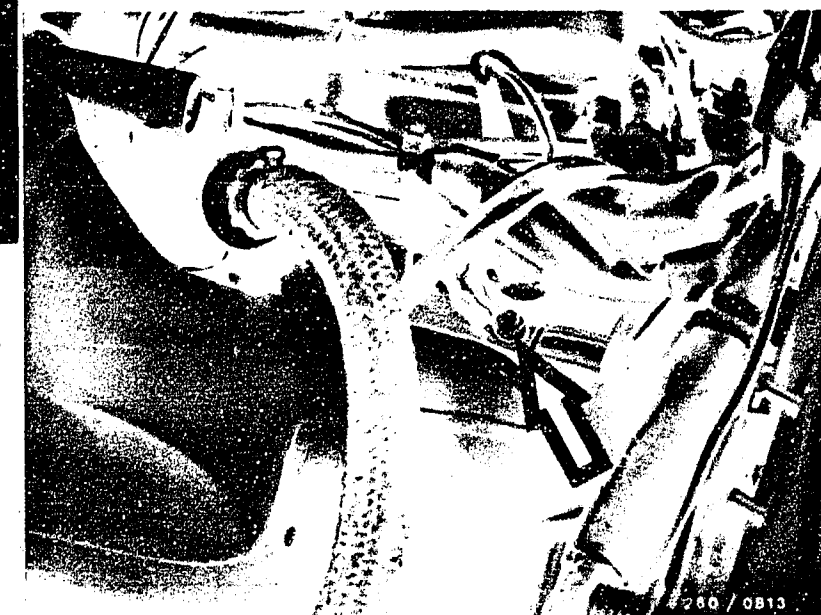


Engine starts and then dies (continued)



2=Auxiliary-air device

Arrow=Ground terminal, output stage



F5

Engine starts and then dies
BMW 318i, 518i



F6

Engine starts and then dies
BMW 318i, 518i



Engine starts and then dies (continued)

yes

Are all hose lines and electrical lead connections put on correctly, without sharp bending or damage? Visual inspection. Has the air intake system been checked for leaks at 0.3 bar gauge pressure?

no

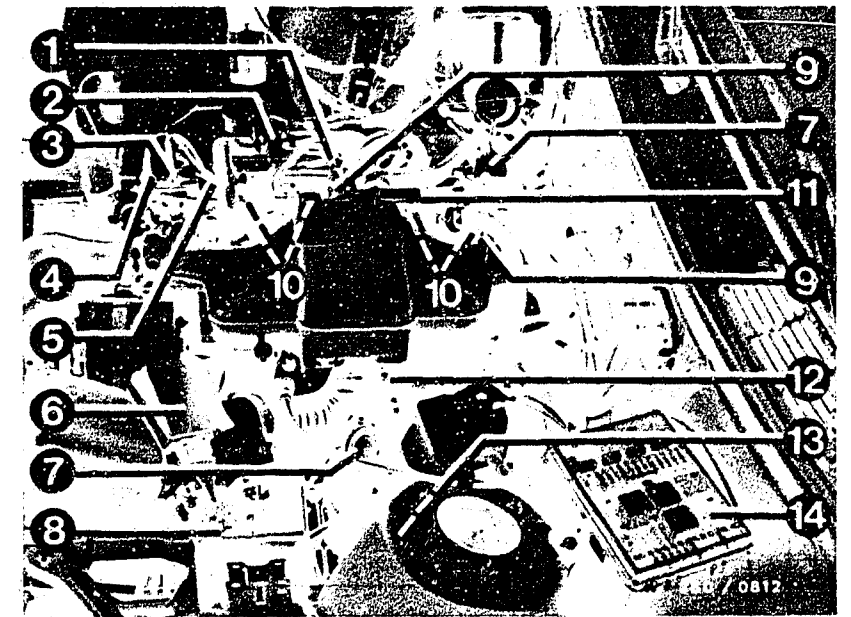
Check that the hoses of the air-intake system and the fuel line system are put on correctly, without sharp bending or damage. If need be, take out and replace the hoses. Eliminate leaks using new seals or by tightening the connection screws.

Testing for leaks:

Seal off the exhaust pipe. Release the clamps at the air filter. Lift off the top part of the air filter and seal the air-flow sensor channel. Disconnect the hose after the auxiliary-air device and, using a compressed air gun, blow air (0.3 bar gauge pressure) into the intake manifold. Seal off the auxiliary-air device connection. In so doing, open the throttle valve completely. Using soapy water, spray or brush on all seal locations. Leaks can also occur at the following points on the engine: The oil dipstick has not been inserted firmly, the cover seal for the oil filling pipe is defective, etc. Bubbling or foaming indicates leaks.

yes

Continued on F9/F10



Model for Europe

- 1=Electric starting valve
- 2=Auxiliary-air device
- 3=NTC II
- 4=Thermotime switch
- 5=Pressure regulator
- 6=Air-flow sensor
- 7=Fuel-line-pressure damper
- 8=Control relay
- 9=Ground terminals
- 10=Electric fuel-injection valves
- 12=Throttle valve switch

F7

Engine starts and then dies
BMW 318i, 518i



F8

Engine starts and then dies
BMW 318i, 518i



Engine starts and then dies (continued)

yes

Model for Sweden/Switzerland:

The secondary air induction system has been installed here as an additional measure to reduce the toxic substances in the exhaust gas.

• Testing for leaks:

In addition, the lines for the secondary air induction system and the air valves must be checked.

Model for the US:

Because of the strict exhaust gas regulations in the USA, a lambda closed-loop control with a 3-bed catalytic convertor must be installed in these engines. In addition, the USA model has an idle actuator instead of the auxiliary-air device, i.e., an idle speed control built by VDO.

• Testing for leaks:

In addition, the hoses for the idle speed control system must be checked.

Other possible defects:

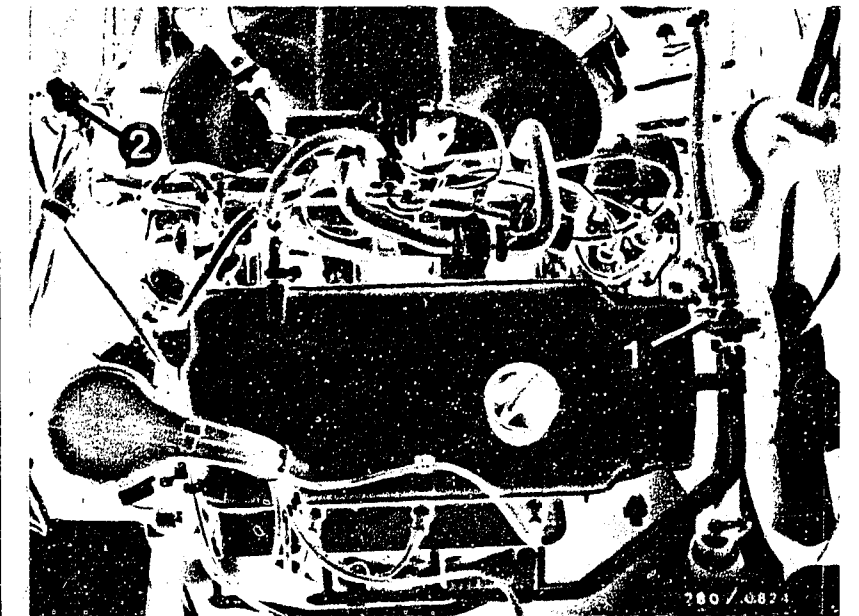
- The customer complaint has been incorrectly identified. (See Coordinates C3...C8). If the defect has not been identified using the "Targeted trouble-shooting," see "Detailed trouble-shooting." (Coordinates C3/C4).
- The engine is not O.K. mechanically (compression, valve setting, valve timing, wear on camshaft).

Checking of the customer complaint:

"Engine starts and then dies,"

has been completed.
Has the customer complaint been corrected?

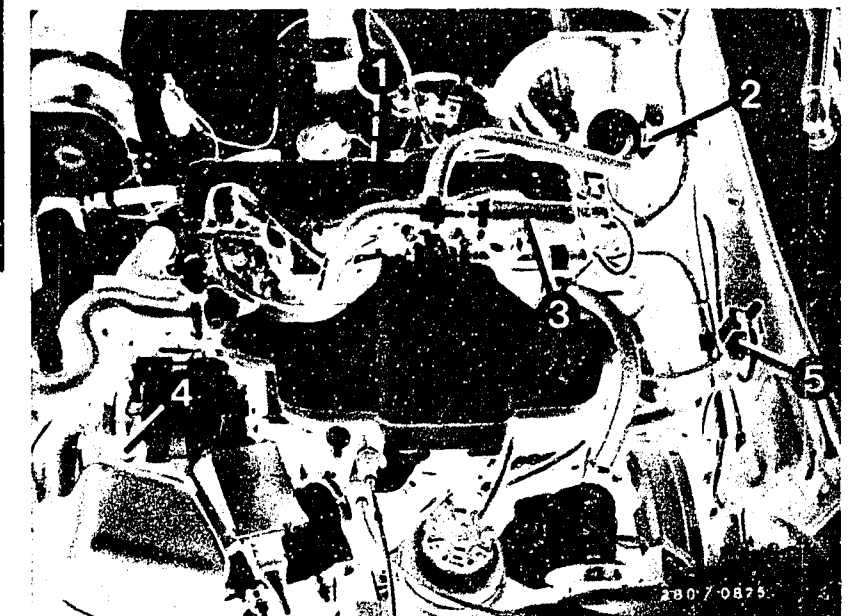
no



Model for Sweden/Switzerland
1=natural aspiration air valves
2=Solenoid-operated valve

Model for US

- 1=Lambda sensor
- 2=Sensor connection
- 3=Idle actuator (VDO)
- 4=Pressure sensor (altitude sensor)
- 5=Solenoid-operated valve



F9

Engine starts and then dies
BMW 318i, 518i



F10

Engine starts and then dies
BMW 318i, 518i



ROUGH IDLE, INCORRECT IDLE SPEED

Trouble-shooting program according to customer complaint

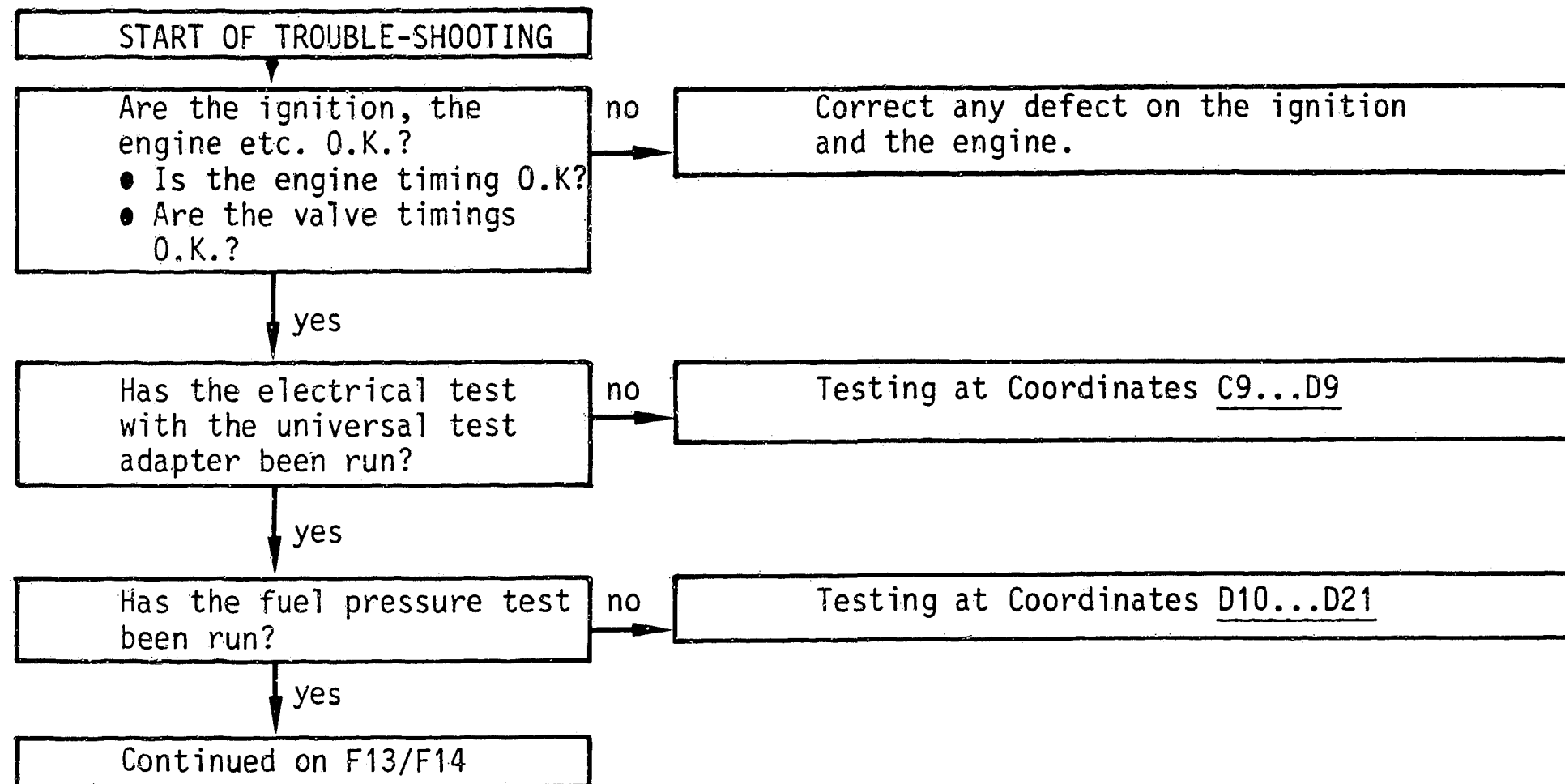
How to use the trouble-shooting program

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If the questions can be answered clearly with "yes" even before testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no" and a defect is suspected, you must shift to the column of boxes at the center and run the tests indicated there. On completion of the testing, the trouble-shooting is continued at that point at which the shift was made.



F11

Rough idle
BMW 318i, 518i



F12

Rough idle
BMW 318i, 518i



Rough idle, incorrect idle speed (continued)

yes

Is the throttle valve closed?

- Does the throttle valve lever strike against the stop screw?
- Is the accelerator cable free of stress?
- Is the accelerator cable free of kinking?

no

• Testing:

If the throttle valve is correctly adjusted, there must be a gap present between the housing and the throttle valve. The vacuum holes must be free.

• Throttle valve setting:

Adjust the throttle valve gap by turning the throttle valve stop screw. There must be a gap! After completion of adjustment, secure the screws with locking paint.

- If the accelerator cable is kinked, take it out and replace it.

yes

Has the throttle valve switch been correctly set?

- Does the idle contact close?
- Does the microswitch click audibly?

no

• Adjustment of the throttle valve switch

Release the fastening screws on the throttle valve switch somewhat.

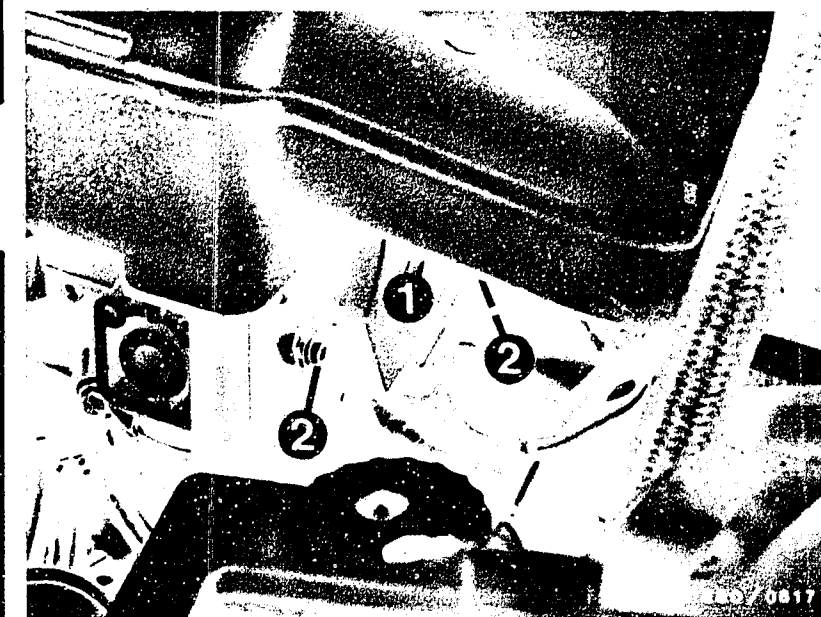
- Connect an ohmmeter to the throttle valve switch between Term. 2 and Term. 18. Turn the throttle valve switch far enough to the right so that the idle contact closes. (The microswitch clicks audibly.) Reading 0 Ω .

• Checking the setting:

Pull on the accelerator cable slightly. The idle contact opens. (The microswitch clicks audibly.) Reading $\infty \Omega$.

yes

Continued on F15/F16



1=Throttle valve switch
2=Fastening screws

F13

Rough idle

BMW 318i, 518i



F14

Rough idle

BMW 318i, 518i



Rough idle, incorrect idle speed (continued)

yes

Is the auxiliary-air device O.K. mechanically?
Open passage:
• cold → open?
• warm → closed?
• Does the engine speed drop when the hose is clamped off? (cold engine).

no

Testing:

- Visual inspection of the auxiliary-air device. Disconnect the hoses and look through. (If necessary, use a small mirror to do so.) When cold, the cross-section must be partially open, when warm it must be closed. If not, take out and replace the auxiliary-air device.
- Functional test of the auxiliary-air device: With the engine cold, clamp off the hose to the auxiliary-air device. The engine speed must drop off. With the engine warm, clamp off the hose to the auxiliary-air device. The engine speed must not drop off noticeably. Otherwise, take out and replace the auxiliary-air device. (Watch the direction of through flow.)

yes

Is the electrical operation of the auxiliary-air device (voltage supply, ground lead, resistance value) O.K.?

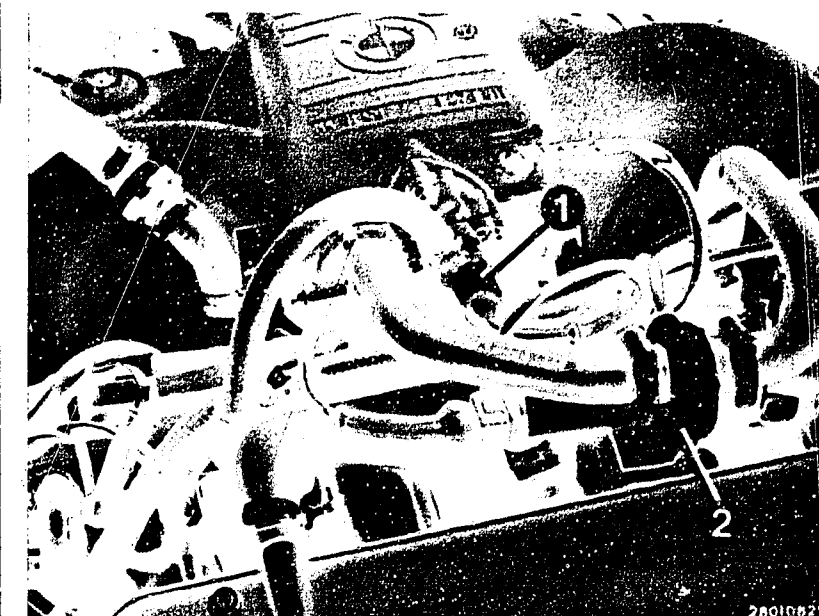
no

Start the engine.

- Voltage at the lead plug min. 12 V. If not, check the following leads for continuity (specified value approx. 0 Ω).
- From Term. 26 to the ground terminal output stage
- From Term. 9/2 to the control unit plug Term. 9.
- Resistance of the auxiliary-air device 30...65 Ω (lead plug disconnected). If the resistance is not within tolerance, take out and replace the auxiliary-air device.

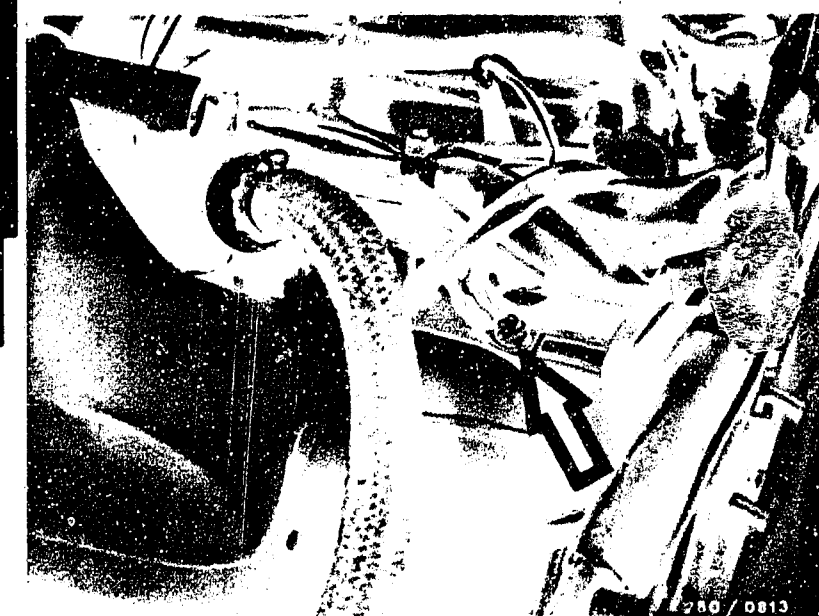
yes

Continued on F17/F18



2=Auxiliary-air device

Arrow=Ground terminal, output stage



F15

Rough idle
BMW 318i, 518i



F16

Rough idle
BMW 318i, 518i



Rough idle, incorrect idle speed (continued)

yes

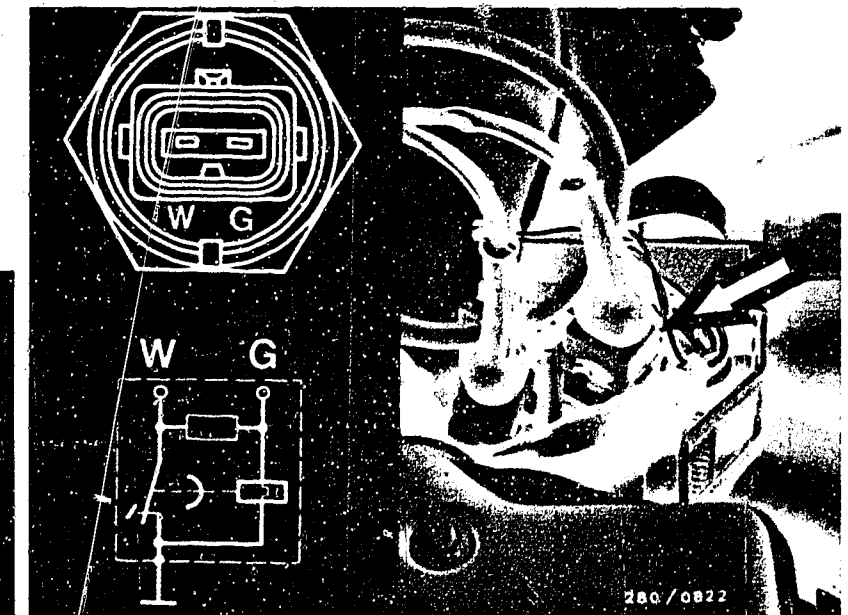
Is the thermotime switch O.K.?

no

- **Electrical test:**
Check the thermotime switch 35°/8 sec. as follows: Disconnect the plug and take measurements directly on the thermotime switch using an ohmmeter.
 1. Between Term. "G" and ground at ambient temperature (less than +30°C): 25...40 Ω
with engine at normal operating temp. (above +40°C): 50...80 Ω
 2. Between Term. "W" and ground at ambient temperature (less than +30°C): 0 Ω
with engine at normal operating temp. (above +40°C): 100...160 Ω
 3. Between Term. "G" and "W" at ambient temperature (less than +30°C): 25...40 Ω
with engine at normal operating temp. (above +40°C): 50...80 Ω

yes

Continued on F19/F20



Arrow=Thermotime switch
(brown plug)

F17

Rough idle
BMW 318i, 518i



F18

Rough idle
BMW 318i, 518i



Rough idle, incorrect idle speed (continued)

yes

Is the electric starting valve O.K.?

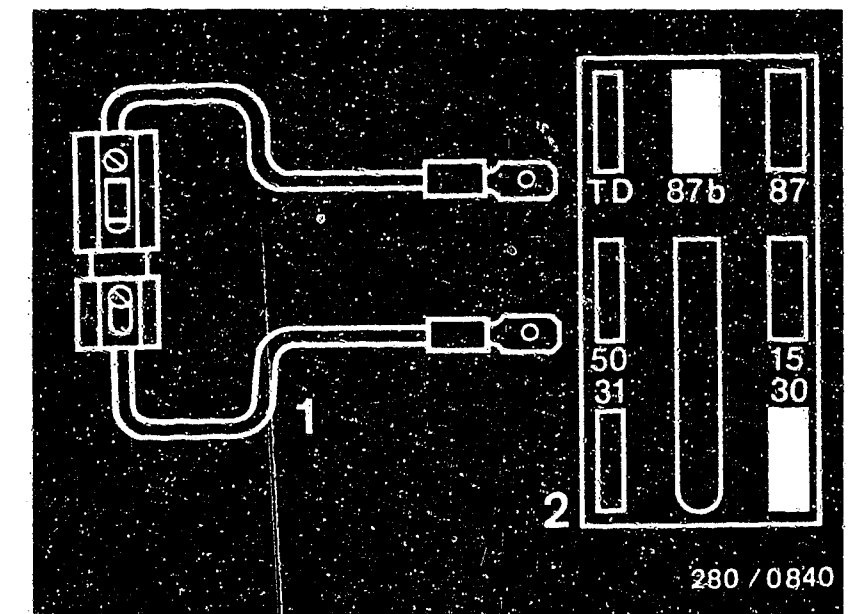
no

- Check the electric starting valve for leaks:
1. In the engine:
Clamp off the fuel delivery line at the electric starting valve. If the engine then runs smoothly, take out and replace the electric starting valve.
2. Taken out of the vehicle:
Take out the electric starting valve.
(Caution: Fire hazard!) The fuel and the electrical lines remain connected. (Place a catch basin under the starting valve!) Build up the fuel pressure (disconnect the control relay, insert a jumper cable between Term. 87b and Term. 30 in the connection socket).
Test specification: It is permissible for a maximum of one drop to form within one minute at the valve opening.

Caution!
Be absolutely certain to remove the jumper after completion of the test and to plug the control relay back on.

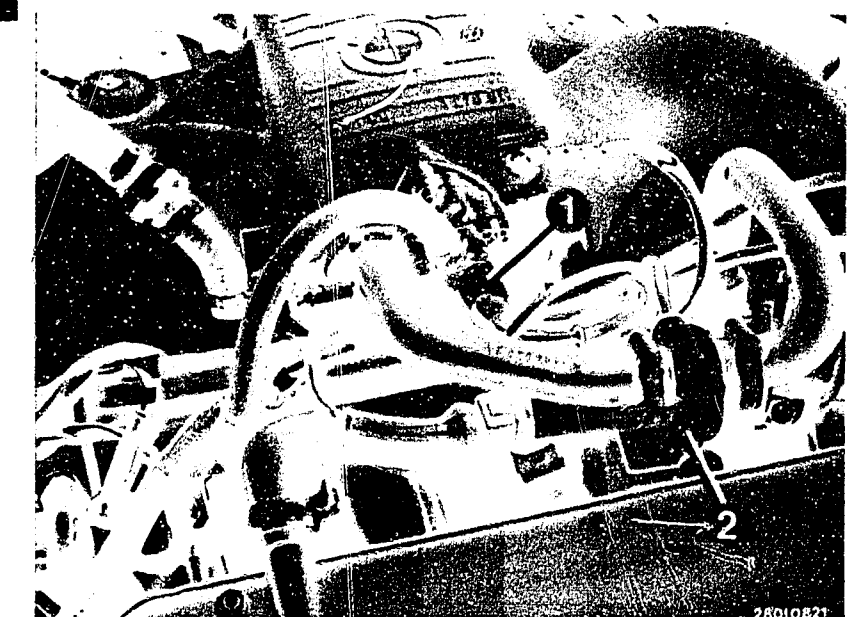
yes

Continued on F21/F22



Jumper cable (user-fabricated)
1=Fuse holder with 10A fuse
2=Top view of connection socket

1=Electric starting valve
(blue plug)



F19

Rough idle

BMW 318i, 518i



F20

Rough idle

BMW 318i, 518i



Rough idle, incorrect idle speed (continued)

yes

Has the operation of the electric fuel-injection valves been checked?

no

- Checking the operation of the electric fuel-injection valves

Connect the test lead as follows:

The 2-pole plug connections for the test lead are connected between an electric fuel-injection valve and its connecting lead. Only one of the other two connecting terminals of the test lead needs be connected to the special input on the motortester.

Caution!

The unused connection terminal must not come into contact with the vehicle ground!

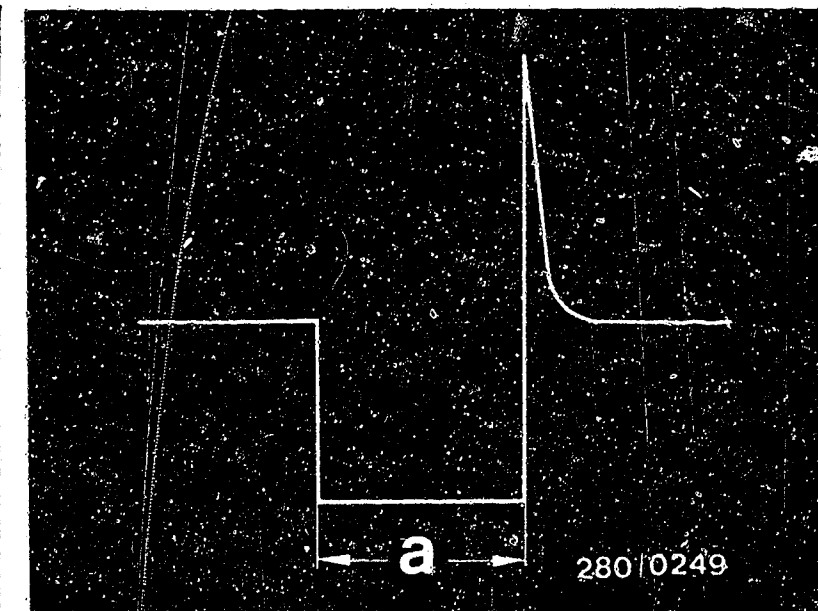
- When connected correctly, the pattern shown at the right appears on the oscilloscope. Using the test lead, it is possible to check the fuel-injection pulses on the electric fuel-injection valves while the engine is running, using an ignition oscilloscope. If the pattern at the right is not obtained, or if deviations can be seen (interference, missing, etc.), the other electric fuel-injection valves should also be examined.
- If there is interference: check how the leads have been laid.
- If there is missing: eliminate loose contacts in the leads or in the plug connections.

N. B.!

After testing, restore the original condition of installation.

yes

Continued on F23/F24



Fuel-injection pulses of a connected output stage (measured on the electric fuel-injection valve)
a=pulse length (dependent on the engine load)

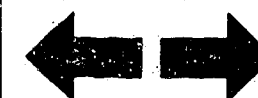
F21

Rough idle
BMW 318i, 518i



F22

Rough idle
BMW 318i, 518i



Rough idle, incorrect idle speed (continued)

yes

Are the electric fuel-injection valves O.K. mechanically?
Repair the electric fuel-injection valves.

Is the O-ring O.K.?

no

• Checking the electric fuel-injection valves mechanically and electrically

With the engine running, disconnect the electric fuel-injection valve plugs individually, one after the other, from the electric fuel-injection valves and plug them back on. If the electric fuel-injection valve is good, the engine speed must drop off. Check the connecting leads from the control relay Term. 87 to the individual electric fuel-injection valves and from the electric fuel-injection valves to the control unit plug Term. 12 for continuity using an ohmmeter.

Specified value: approx. 0 Ω

Resistance of the individual electric fuel-injection valves

0 280 150 209/211: 15...20 Ω

0 280 150 703/704: 14.5...19.5 Ω

N. B.!

• Take out and replace the O-ring

When replacing electric fuel-injection valves, the electric fuel-injection valve ... 209/704 must be installed (model for Europe/Sweden/Switzerland). For the US model, the same electric fuel-injection valve must be re-installed (... 211 or ... 703). If the electric fuel-injection valves are operating properly but the O-rings are defective, proceed as follows:

Take out the fuel distribution pipe. (Release 2 fastening screws.) Disconnect the electrical connection. Carefully push the holding clamp out of the slot and pull the electric fuel-injection valve out of the distribution pipe. Caution! Catch any fuel that runs out. Do not allow it to drip on hot portions of the engine.

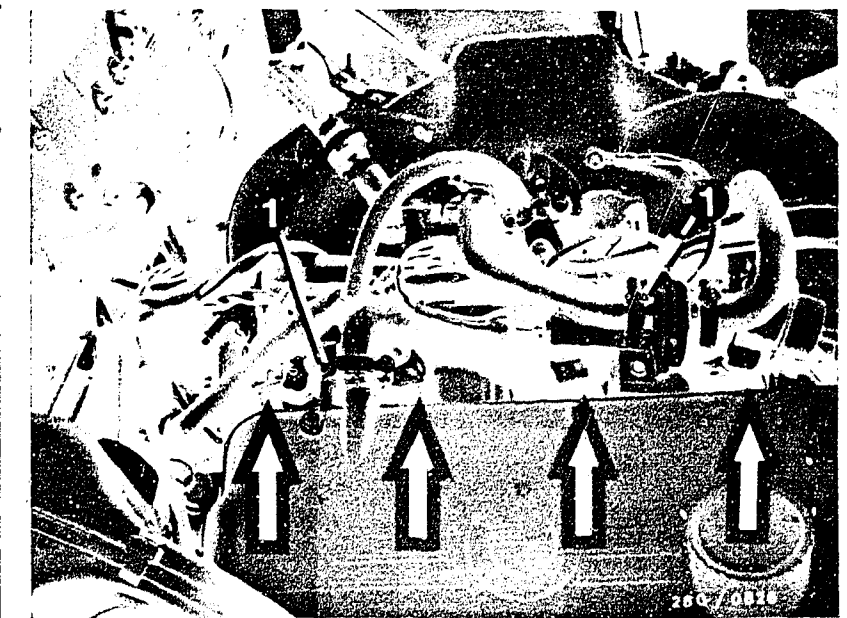
Caution!

The protective sleeve must not be pried off.

yes

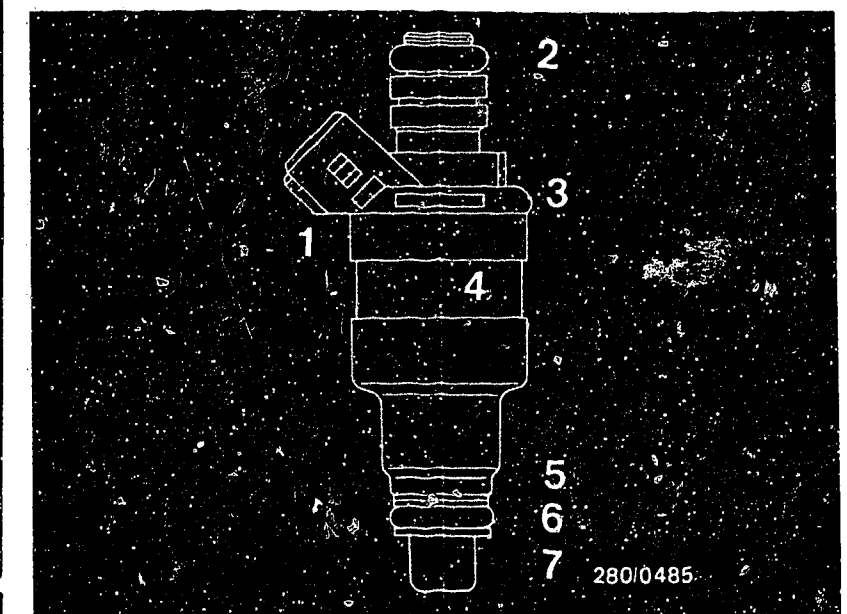
Continued on G3/G4

Continued on G1/G2



Arrows=Electric fuel-injection valves
1=Fastening screws

1=FD marking
2=upper O-ring
3=Part No.
4=Fuel-injection valve
5=Supporting plate (yellow, 2mm)
6=lower O-ring
7=Protective sleeve



F23

Rough idle
BMW 318i, 518i



F24

Rough idle
BMW 318i, 518i



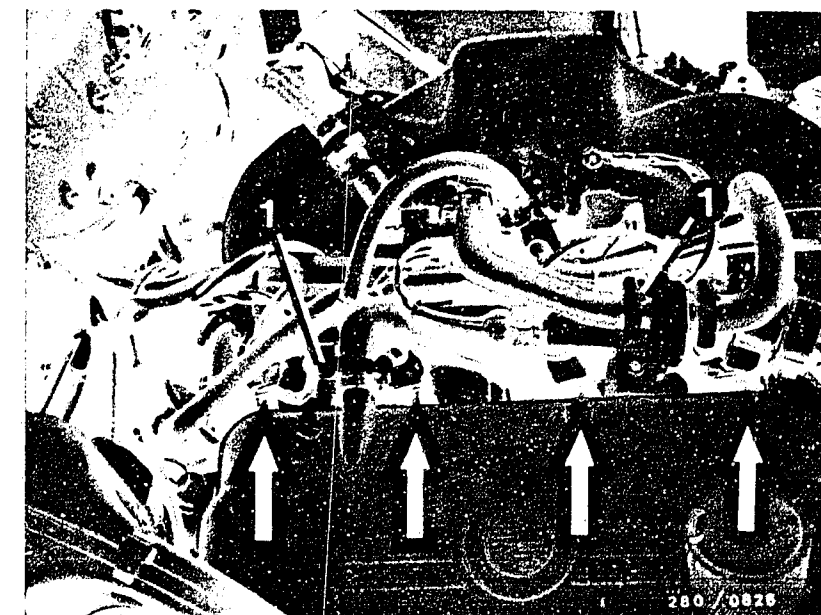
Rough idle, incorrect idle speed (continued)

Cut apart the lower O-ring (intake manifold).
Caution! Do not damage the protective sleeve.
Pull a new O-ring on over the protective sleeve
and its shoulder. Do not damage any parts in so
doing.
Use set of parts 1 287 010 704.
When working on the electric fuel-injection
valves, do not damage the valve needle. If the
upper O-ring (fuel distribution pipe connection) is
swollen or damaged, it also must be taken out and
replaced.

N. B.! It is permissible to grease the 2 O-rings
only lightly before installation (silicone grease
Ft 2 v 1).

The other parts of the electric fuel-injection
valve must remain free of grease.

N. B.! After testing, restore the original
condition of installation.



Arrows=Electric fuel-injection valves
1=Fastening screws

yes

Continued on G3/G4

G1

Rough idle
BMW 318i, 518i



G2

Rough idle
BMW 318i, 518i



Rough idle, incorrect idle speed (continued)

yes

Is the air-flow sensor mechanically and electrically O.K.?

Is the resistance within tolerance?

Between Term. 8 and Term. 9:
160... 300 Ω

Between Term. 7 and Term. 5
(deflect air-flow sensor flap):
60...1000 Ω

no

Testing:

Release the clamps on the air filter.
Lift off the upper portion of the air filter.

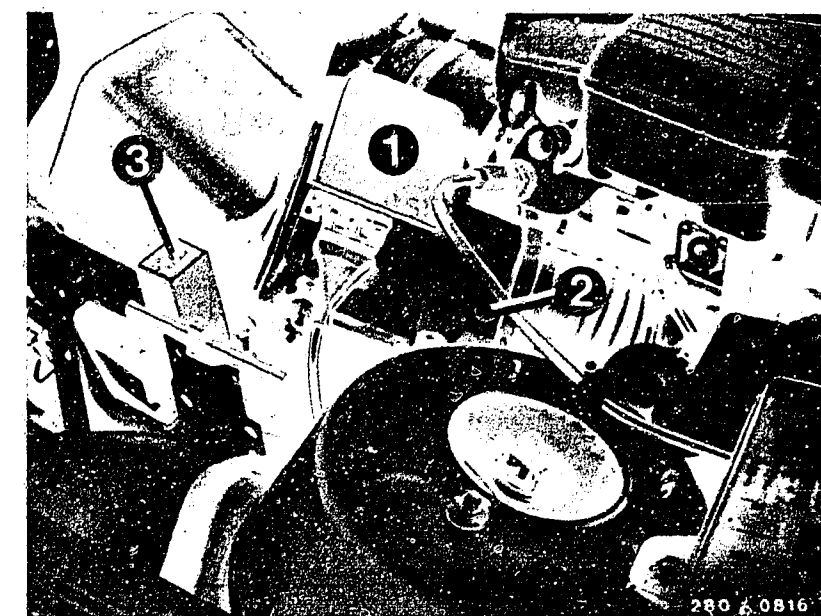
- Check the air-sensor flap for easy movement
Open the air-flow sensor flap manually. It must be uniformly easy to open the air-flow sensor flap as far as the stop, and the flap must then close again as far as the stop by itself. The air-flow sensor flap must not stick when opening.
- Check the air-flow sensor mechanically
Watch for signs of grinding. If the air-flow sensor is very dirty inside, clean it and rub it out with a lint-free cloth. If there are signs of grinding, the air-flow sensor must be taken out and replaced.
- The air-flow sensor flap must return to the at-rest position. If not, the stopper or the air-flow sensor flap is bent out of shape. The air-flow sensor must be taken out and replaced.
- Check resistances
Connect an ohmmeter to Term. 8 and Term. 9 on the air-flow sensor.
Test specification: 160...300 Ω
Connect an ohmmeter to Term. 7 and Term. 5 of the air-flow sensor.
Deflect the air-flow sensor flap.
Test specification: 60...1000 Ω

N. B.!

On completion of the test, the air filter and the air-flow sensor must be put back together.

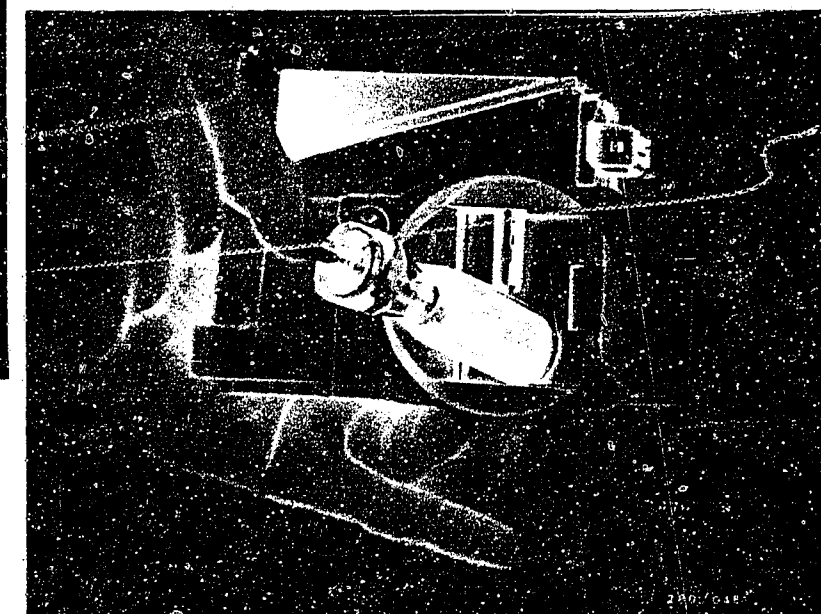
yes

Continued on G5/G6



1=Air-flow sensor
2=CO-adjusting screw

Pressing on the sensor flap in the air-flow sensor



G3

Rough idle

BMW 318i, 518i



G4

Rough idle

BMW 318i, 518i



Rough idle, incorrect idle speed (continued)

Are all hose lines and electrical lead connections put on correctly, without sharp bending or damage?
Visual inspection.
Has the air intake system been checked for leaks at 0.3 bar gauge pressure?

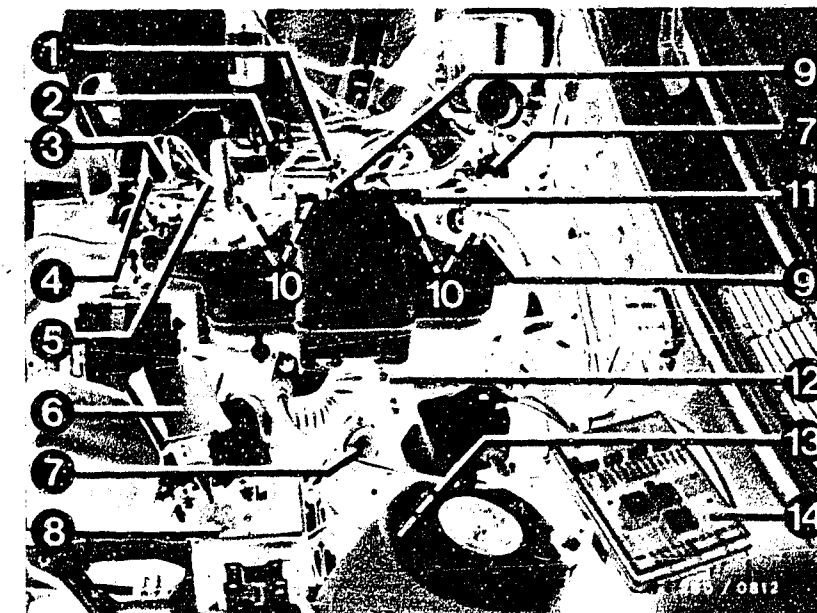
no

- Check that the hoses of the air-intake system and the fuel line system are put on correctly, without sharp bending or damage. If need be, take out and replace the hoses. Eliminate leaks using new seals or by tightening the connection screws.
- Testing for leaks:
Seal off the exhaust pipe. Release the clamps at the air filter. Lift off the top part of the air filter and seal the air-flow sensor channel. Disconnect the hose after the auxiliary-air device and, using a compressed air gun, blow air (0.3 bar gauge pressure) into the intake manifold. Seal off the auxiliary-air device connection. In so doing, open the throttle valve completely. Using soapy water, spray or brush on all seal locations. Leaks can also occur at the following points on the engine: The oil dipstick has not been inserted firmly, the cover seal for the oil filling pipe is defective, etc.
Bubbling or foaming indicates leaks.

yes

Continued on G9/G10

Continued on G7/G8



Model for Europe

- 1=Electric starting valve
- 2=Auxiliary-air device
- 3=NTC II
- 4=Thermotime switch
- 5=Pressure regulator
- 6=Air-flow sensor
- 7=Fuel-line-pressure damper
- 8=Control relay
- 9=Ground terminals
- 10=Electric fuel-injection valves
- 12=Throttle valve switch

G5

Rough idle
BMW 318i, 518i



G6

Rough idle
BMW 318i, 518i



Rough idle, incorrect idle speed (continued)

yes

Model for Sweden/Switzerland

The secondary air induction system has been installed here as an additional measure to reduce the toxic substances in the exhaust gas.

- Testing for leaks:

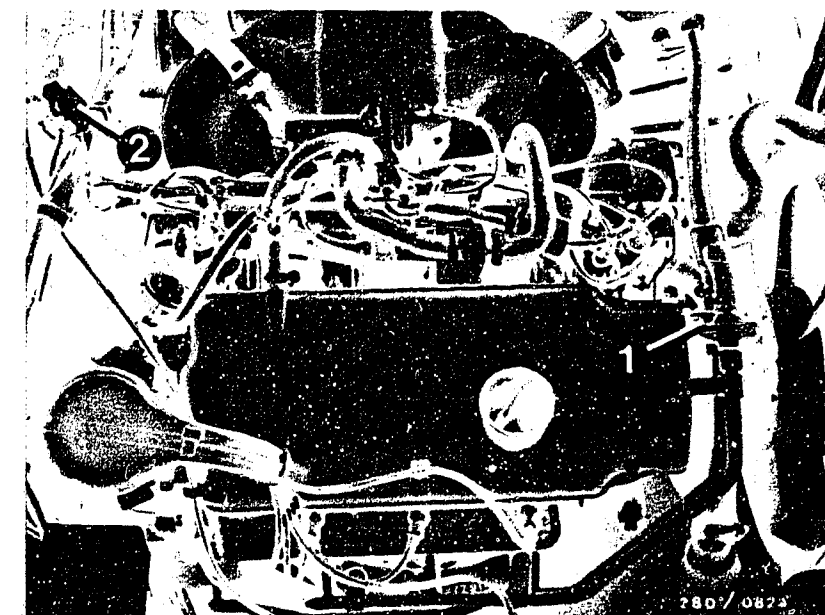
In addition, the lines for the secondary air induction system and the air valves must be checked.

Model for the US:

Because of the strict exhaust gas regulations in the USA, a lambda closed-loop control with a 3-bed catalytic convertor must be installed in these engines. In addition, the USA model has an idle actuator instead of the auxiliary-air device, i.e., an idle speed control built by VDO.

- Testing for leaks:

In addition, the hoses for the idle speed control system must be checked.

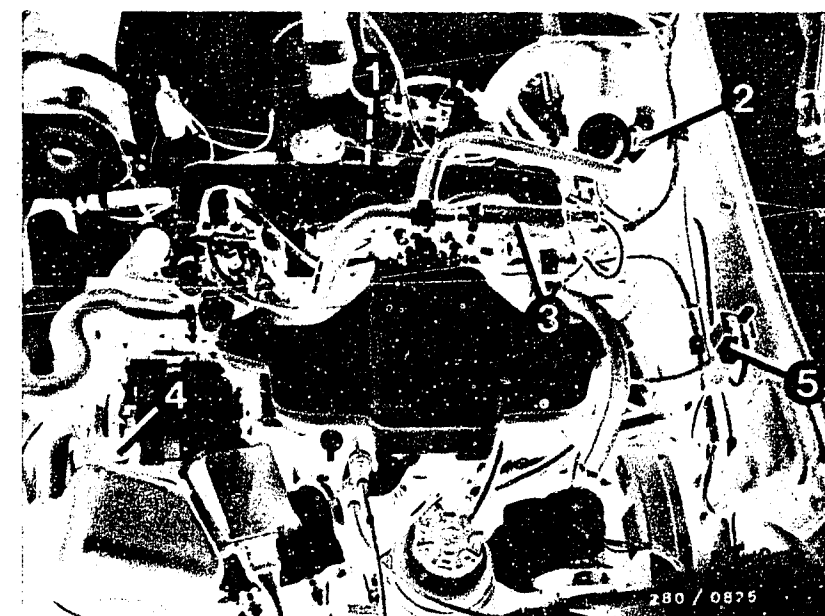


Model for Sweden/Switzerland

1=natural aspiration air valves
2=Solenoid-operated valve

Model for US

1=Lambda sensor
2=Sensor connection
3=Idle actuator (VDO)
4=Pressure sensor (altitude sensor)
5=Solenoid-operated valve



Continued on G9/G10

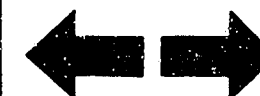
G7

Rough idle
BMW 318i, 518i



G8

Rough idle
BMW 318i, 518i



Rough idle, incorrect idle speed (continued)

yes

Have the CO and idle speed been correctly set?
(only for the model for EU/S/
Switzerland)

Test specification:

Idle speed:

800...900 min⁻¹

CO-level

Europe: less than
1.0 vol. % CO

Model for Sweden/Switzerland:

0.2...0.4 vol. % CO

Are these test specifications
being met?

yes

Idle speed can not be
adjusted.

yes

Continued on G11/G12

no

• Adjustment of CO and idle speed

- Exhaust gas adjustment using the exhaust analyzer with engine at normal operating speed and at idle speed. For duration of the exhaust gas measurement and adjustment, switch the exhaust gas system off.

• Idle speed:

Manual transmissions and automatic trans-
missions

(in "Park"):

800 ... 900 min⁻¹

• CO-adjustment:

Model for Europe: less than 1.0 vol. % CO

Model for Sweden/Switzerland:

A secondary-air induction system is installed
in these vehicles because of certain exhaust
gas regulations.

- Test specification:

CO-setting 0.2...0.4 vol.%CO
(with hose on the air valves).

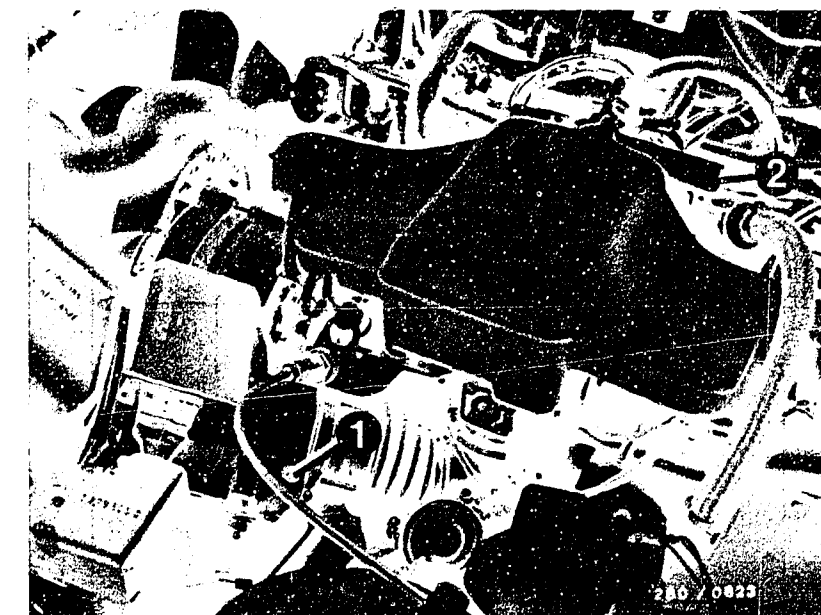
- Setting if there is a defect:

CO-setting: 0.3...1.0 vol.%CO

with the air valve hose taken off and sealed.

- When adjusting the idle speed and CO, in-
activate the secondary-air induction system.
To do this, disconnect the hose between the
air valve and the air filter at the air filter
(arrow) and seal it tightly with a plug. When
operating the vehicle in countries without
more stringent exhaust gas regulations, it is
not necessary to inactivate the secondary-air
induction system.

Continued on G11/G12

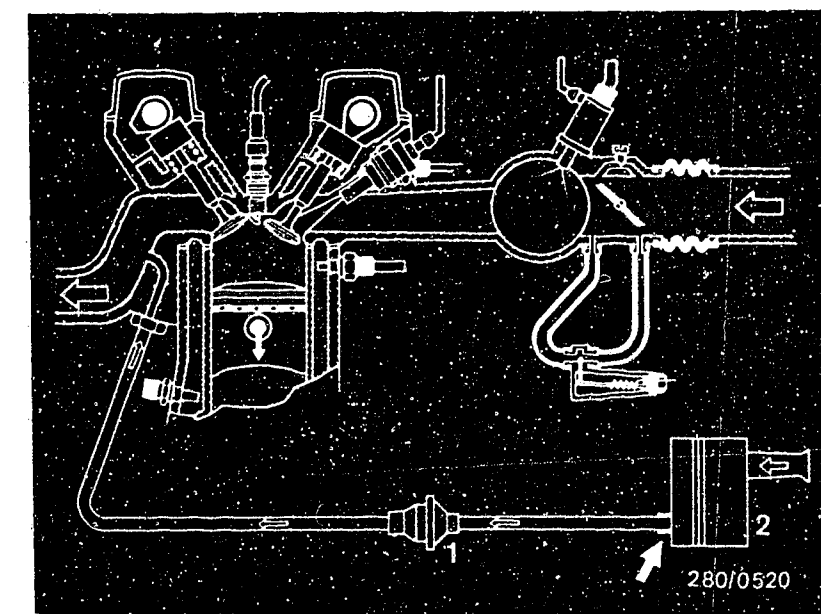


1=CO-adjusting screw

2=Idle-speed adjusting screw

1=Air valve (non-return valve)

2=Air filter



G9

Rough idle

BMW 318i, 518i



G10

Rough idle

BMW 318i, 518i



Rough idle, incorrect idle speed (continued)

yes

Only for model for EU/S/Switzerland:

Checking of the customer complaint:

"Rough idle, incorrect idle speed"

has been completed.
Has the customer complaint been corrected?

yes

For US model only:

- Is the idle speed control (non-Bosch product) O.K.?

- Is the lambda closed-loop control O.K.?

no

no

- For all vehicles:

If the CO-level is too high, adjust the bypass screw (CO-adjusting screw) in the air-flow sensor by one half turn counterclockwise (socket hex screw, AF 5). Recheck the idle speed and the CO-level once again. If need be, make corrections in several steps. After adjustment, use a new (red) plug (1 280 508 012).

- Other possible defects:

- The customer complaint has been incorrectly identified. (See Coordinates C3...C8). If the defect has not been identified using the "Targeted trouble-shooting", see "Detailed trouble-shooting". (Coordinates C3/C4).
- The engine is not O.K. mechanically (compression, valve setting, valve timing, wear on camshaft).

Check the idle speed control and the lambda closed-loop control (Coordinates G13...H2).

G11

Rough idle
BMW 318i, 518i



G12

Rough idle
BMW 318i, 518i



IDLE SPEED CONTROL (Non-Bosch product - for the US model only)

Operation:

The idle speed is stabilized by means of the electronic control unit (in the glove compartment, next to the LU control unit) and the idle actuator. In place of the auxiliary-air device otherwise found, the idle actuator is installed in the air bypass to the throttle valve. The control unit supplies the tractive electromagnet of the idle actuator with a variable timed voltage at a constant frequency. That adjusts the plate in the air channel and changes the amount of air flowing through. The ACTUAL engine speed is derived from the ignition pulses Term. 1. It is compared with a PRESCRIBED engine speed in the control unit, and the idle actuator is triggered accordingly.

Testing:

1. Idle speed controller

Precondition: Battery voltage min. 11.5 V. Control unit plug disconnected from the idle speed controller. Ambient temperature (+15°C...+30°C).

● Voltage supply

- Is the voltage between Pin 2 on the control unit plug and the vehicle ground at least 9 V when the ignition is switched on? If not, check the green/yellow lead from Pin 2 to Term. 15 for continuity. Specified value approx. 0 Ω.
- Is the voltage between Pin 2 and Pin 4 (control unit plug) at least 9 V when the ignition is switched on? If not, check the brown lead from Pin 4 to the ground terminal of the electronic system for continuity. Specified value approx. 0 Ω.

● Term. 1 signal

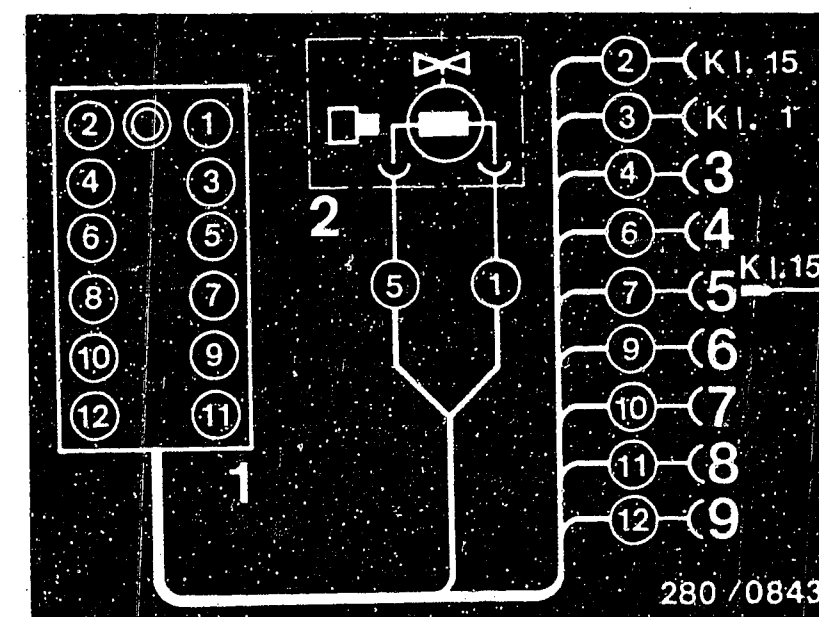
- Is the voltage between Pin 3 and Pin 4 (control unit plug) at least 9 V when the ignition is switched on? If not, check the green lead from Pin 3 to the diagnosis connection Pin 13 for continuity. Specified value approx. 0 Ω.

2. Idle actuator

Precondition: Ambient temperature (+15°...+30°C) and engine at normal operating temperature.

- Disconnect plug from the idle actuator. Measure the resistance between the two connections. Specified value 9 ... 10 Ω. Is this test specification being met? If not, take out and replace the idle actuator.

Continued on G15/G16



K1.=Term.

1=Idle speed controller plug

2=Idle actuator

3=Ground terminal, electronic system

4=Temperature switch +45°C

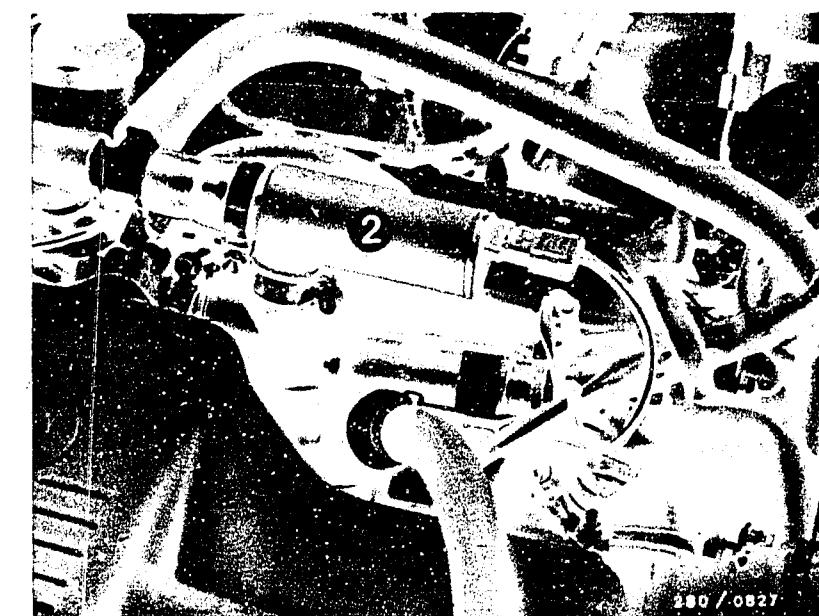
5=Connection, automatic transmission
(plugged with Term. 15 for manual transmission)

6=Switch for air conditioner

7=to temperature switch 0°C

8=to the magnetic coupling

9=to the LU control unit, Term. 2



G13

Idle speed control
BMW 318i, 518i



G14

Idle speed control
BMW 318i, 518i



Idle speed control (continued)

- Connect an ammeter between the idle actuator and the connection plug. Have the engine run. At idle speed ($700...800 \text{ min}^{-1}$) and with the engine at normal operating temperature, the ammeter reads $400...500 \text{ mA}$. If not, check the connecting leads between the idle actuator and the idle speed controller. Eliminate any breaks or poor contacts. If the defect has not yet been corrected, take out and replace the idle speed controller.
- The engine is at normal operating temperature and running at idle speed ($700...800 \text{ min}^{-1}$). Disconnect the connecting plug from the actuator. The engine speed must now rise to approx. 2000 min^{-1} . If not, take out and replace the idle actuator.
- Plug the connecting plug back on the idle actuator. The engine speed must drop back to $700...800 \text{ min}^{-1}$. If not, take out and replace the idle actuator.

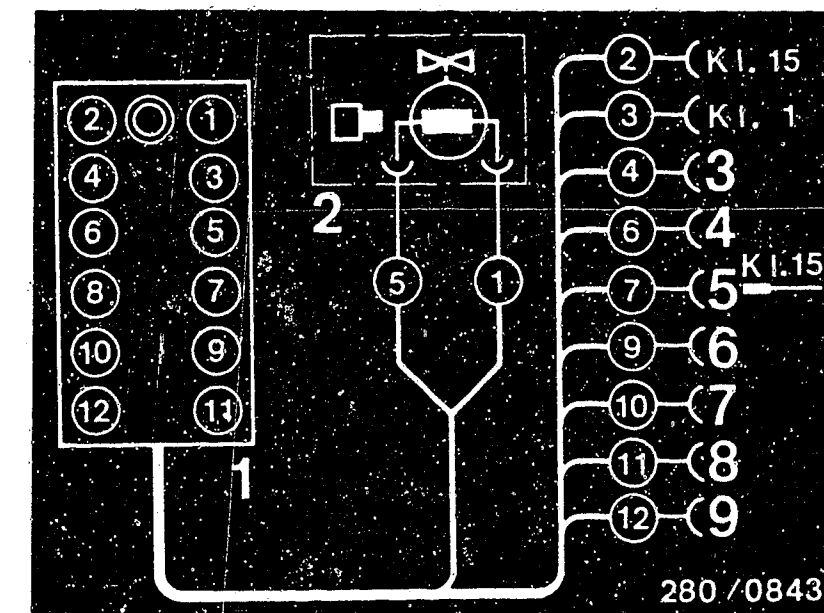
Testing the idle actuator when taken out of the vehicle:

- Apply battery voltage to the idle actuator. The idle actuator must close and must not leak. (Blow through it.)
- Remove the battery voltage. The idle actuator must open.

Testing of the idle actuator and the idle speed controller has been completed.

Additional possible defects:

If there is a change in engine speed when the air conditioner is switched on, during warm-up, or with automatic transmissions, check the installation of cables and the components connected.



K1.-Term.

1=Idle speed controller plug

2=Idle actuator

3=Ground terminal, electronic system

4=Temperature switch $+45^{\circ}\text{C}$

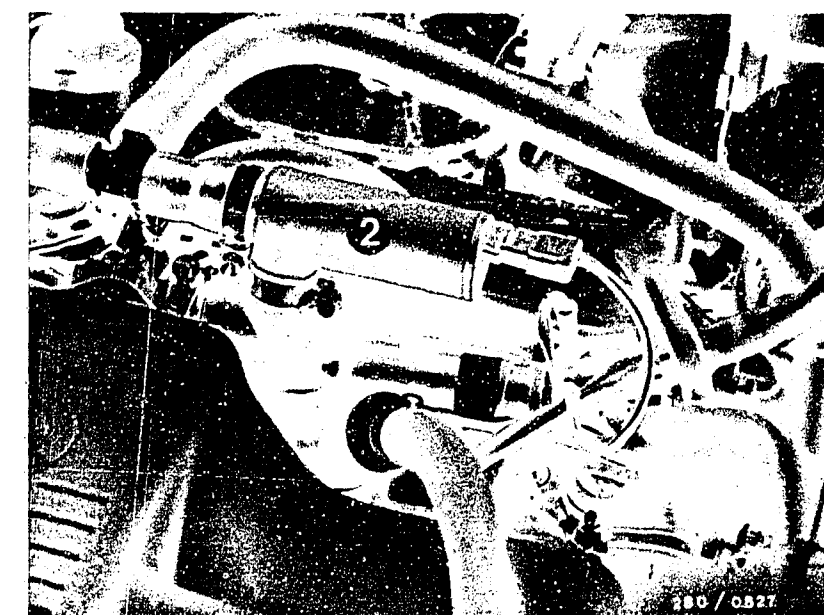
5=Connection, automatic transmission (plugged with Term. 15 for manual transmission)

6=Switch for air conditioner

7=to temperature switch 0°C

8=to the magnetic coupling

9=to the LU control unit, Term. 2



LAMBDA CLOSED-LOOP CONTROL (for US model only)

Checking and adjusting the CO-level in the exhaust by changing the integrator voltage on vehicles with lambda closed-loop controls

Preparations for testing

- Engine must be at normal operating temperature.
- Before testing, the engine must be run approx. 30 sec. at an engine speed of 3000 min^{-1} . The lambda sensor must be warmed up properly.
- If the testing has not been completed after 5 min., the sensor must be warmed up again (3000 min^{-1} for approx. 30 sec.).
- Connect the lambda closed-loop control tester KDJE-P600 to the diagnosis connection No. 5 using the test clip (4). (If need be, fabricate an intermediate adapter.)
- Set the lambda closed-loop control plug to measuring range 12 V.
- Connect the lambda closed-loop control tester to positive (red clip) and negative (black clip) on the battery. The green LED must light up!

Prerequisites for checking the lambda closed-loop controls are that:

- The universal test adapter test program on the Jetronic has been run;
- the fuel pressure test has been run;
- the engine is at normal operating temperature;
- the lead from the activated carbon filter (if there is one) has been disconnected;
- the engine is running.

Idle speed:

The idle speed can no longer be adjusted. (Idle speed control from VDO).

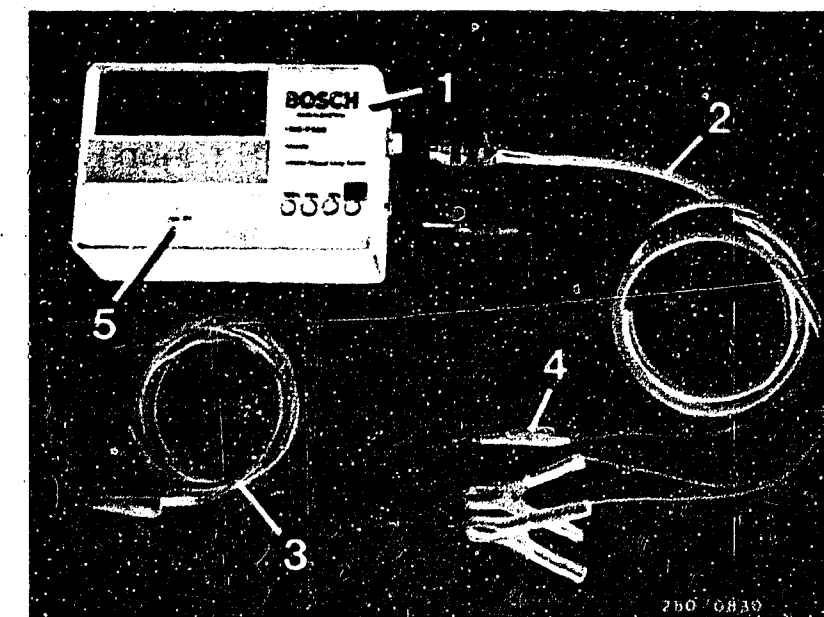
Test specification: $700 \dots 800 \text{ min}^{-1}$

CO-adjustment (integrator voltage):

The CO-level in the exhaust gas is adjusted indirectly via the integrator voltage of the lambda closed-loop control.

When making the adjustment on the bypass screw on the air-flow sensor, the anti-tamper device must be drilled out. (Use suitable, commercially-available tools.)

After the testing, it is absolutely necessary to put in a new lead seal (Part No. 1 283 123 004). The adjustment must be made in small steps (socket hex screw, AF5) and the voltage reading must be checked afterwards in each instance.



1=Lambda closed-loop control tester
KDJE-P600

2=Connecting lead KDJE-P 600/51

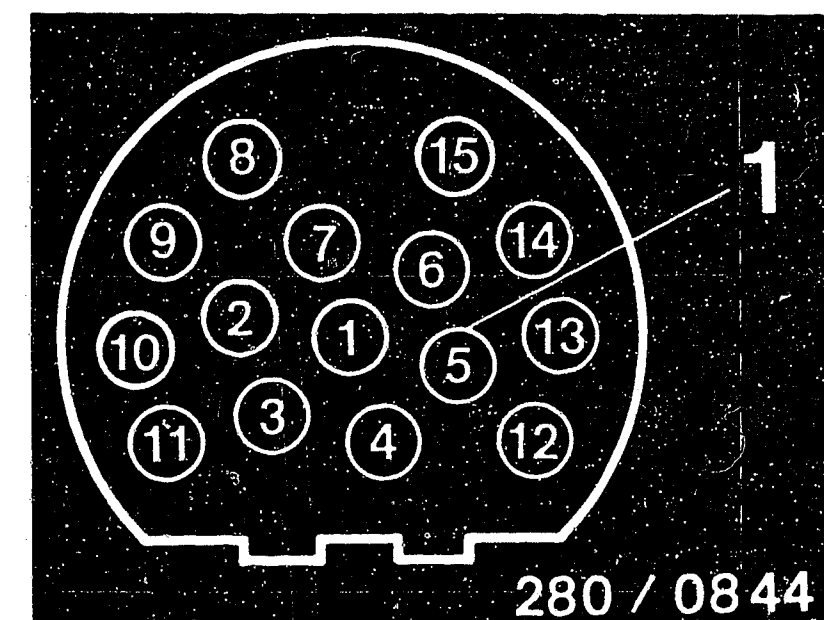
3=Lead KDJE-P 600/1

4=Test clip on Term. 5, diagnosis
connection

5=Reading for voltage supply

Diagnosis connection (top view)
on the front of the engine block near
the thermotime switch

1=Integrator connection



G17

Lambda closed-loop control
BMW 318i, 518i



G18

Lambda closed-loop control
BMW 318i, 518i



Lambda closed-loop control

Adjustment of the idle integrator voltage.

Watch the reading of the lambda closed-loop control tester (idle). The reading must fluctuate back and forth between two values. (Closed-loop control) Is it operating properly?

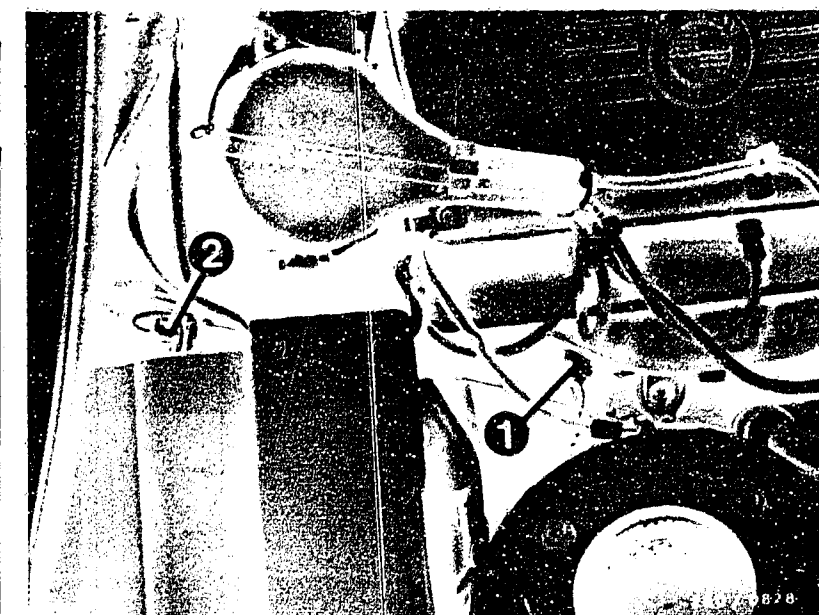
no

yes

Continued on G21/G22

Has the sensor been correctly pre-heated? Run the engine at 3000 min^{-1} for 30 sec. The idle, voltage value now fluctuates back and forth.

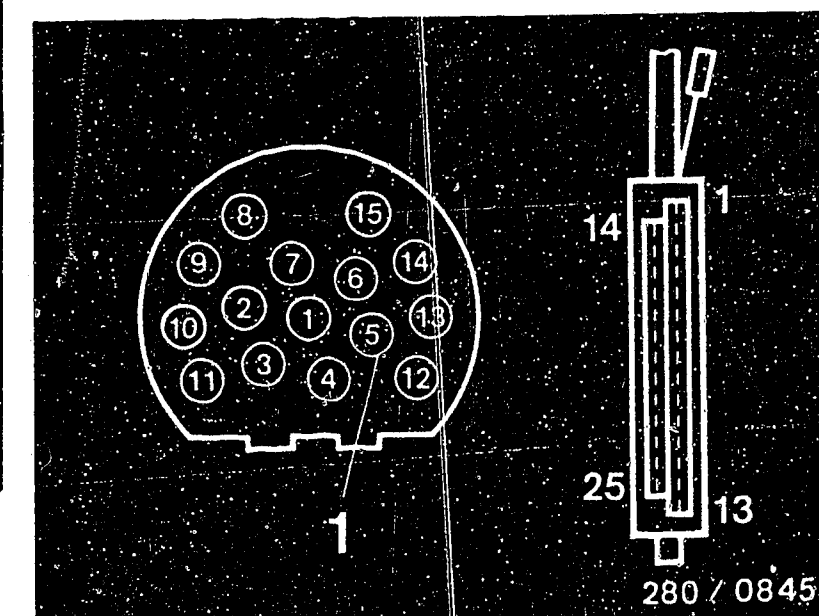
- If not, ignition "OFF". Was the sensor lead incorrectly plugged on at the connecting point? Are there contact resistances? Check and if need be, repair. Does the idle voltage value fluctuate back and forth? If not, ignition "OFF", separate the sensor connection. Check the following leads for continuity.
 - From the control unit plug Term. 20 to the ground terminal for the electronic system. Specified value $\infty \Omega$.
 - Connect lead from the control unit Term. 20 at the connecting location to ground. Specified value approx. 0Ω . If not, take out and replace the lead. N. B.! The sensor lead must be shielded. The lambda sensor must not be checked directly with a multimeter. The measuring current can destroy the lambda sensor! Couple the sensor connection. Run the engine (3000 min^{-1} 30 sec.) Does the idle voltage value now fluctuate back and forth? If not, ignition "OFF". Check the following leads for continuity:
 - From the control unit plug Term. 22 to the diagnosis plug Pin 5. Specified value approx. 0Ω . If not, take out and replace the lead. Does the idle voltage value now fluctuate back and forth? If not,
 - Lambda sensor is defective. When putting a new sensor, use the grease Vs 140 16 Ft.
 - LU control unit is defective.



1=Lambda sensor
2=Sensor connection

Top view of control unit plug at diagnosis connection

1=Integrator connection
Pin 5: diagnosis connection
Term. 22: Control unit plug



G19

Lambda closed-loop control

BMW 318i, 518i

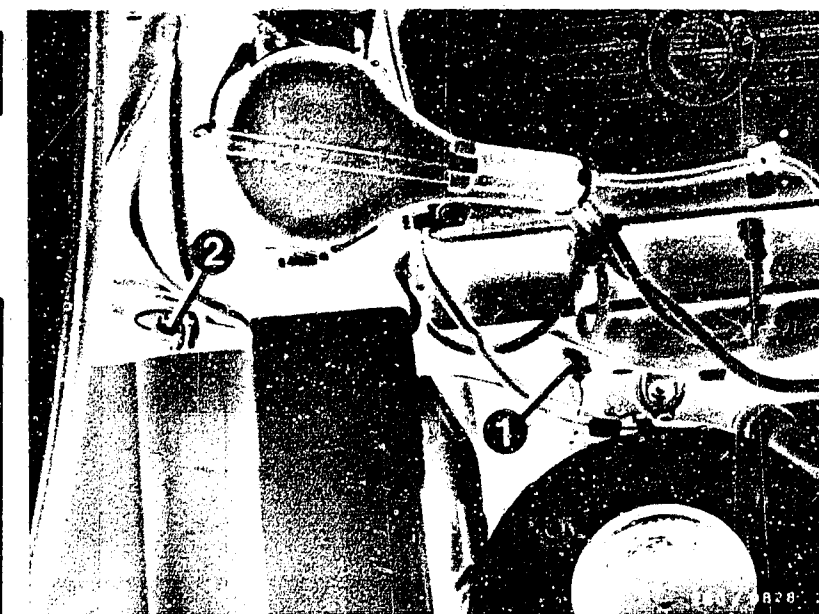
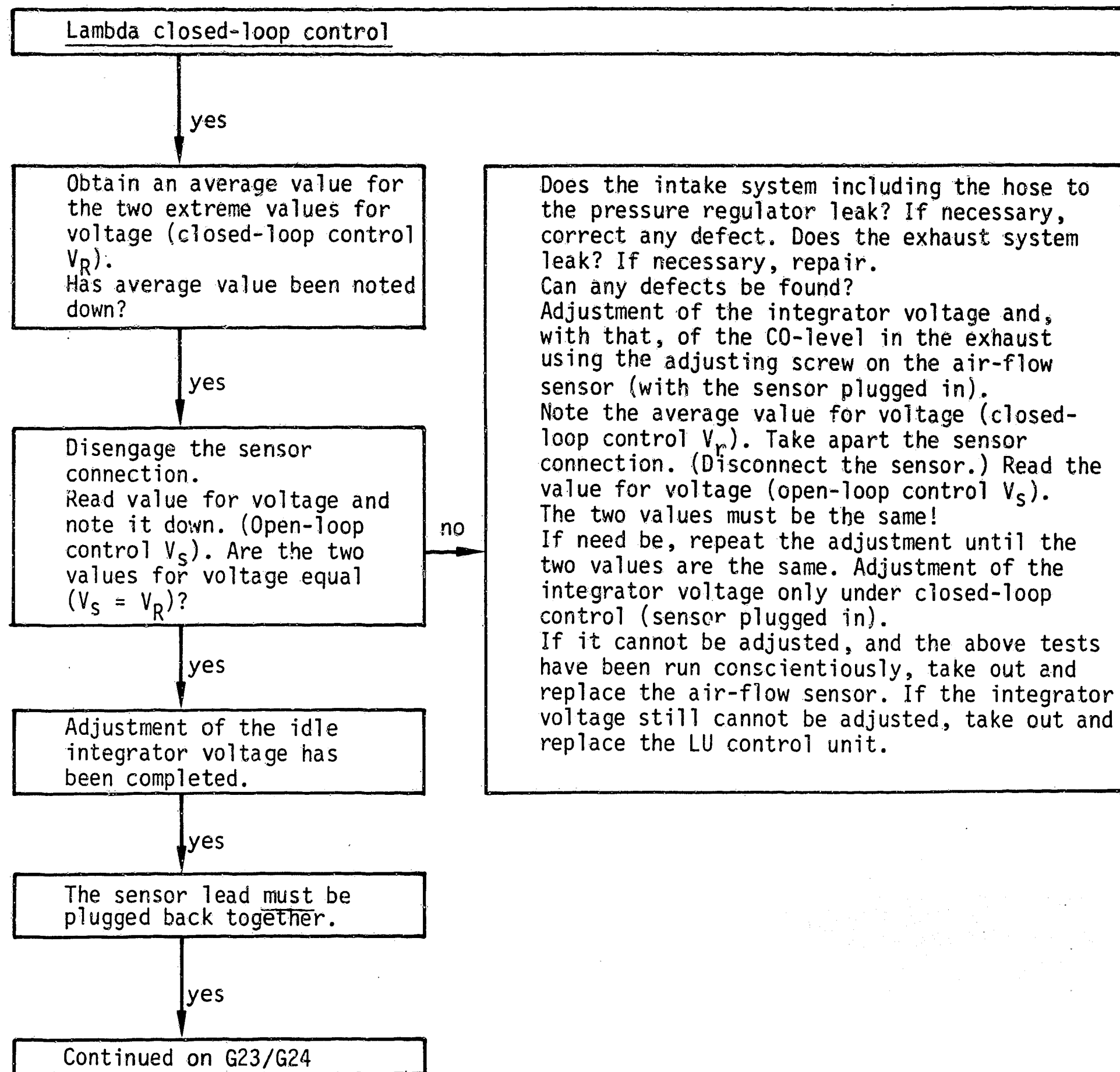


G20

Lambda closed-loop control

BMW 318, 518i

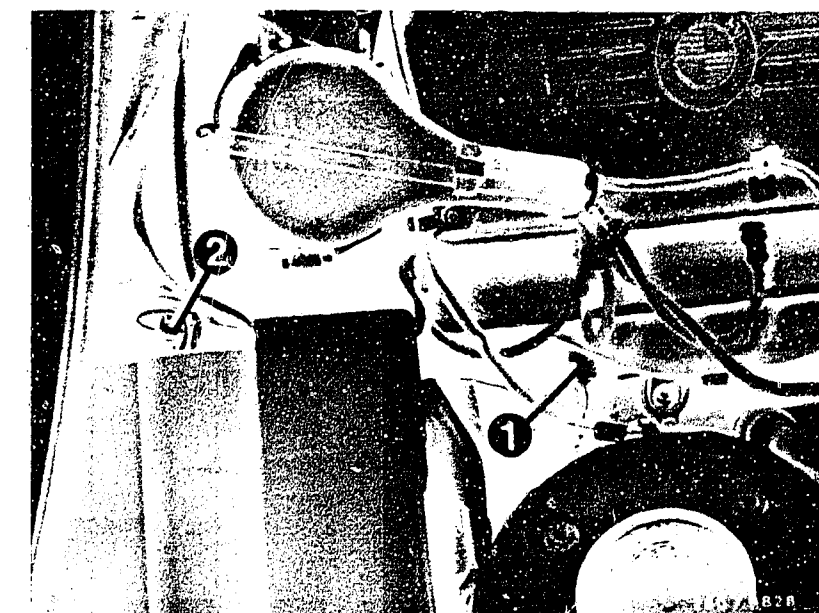
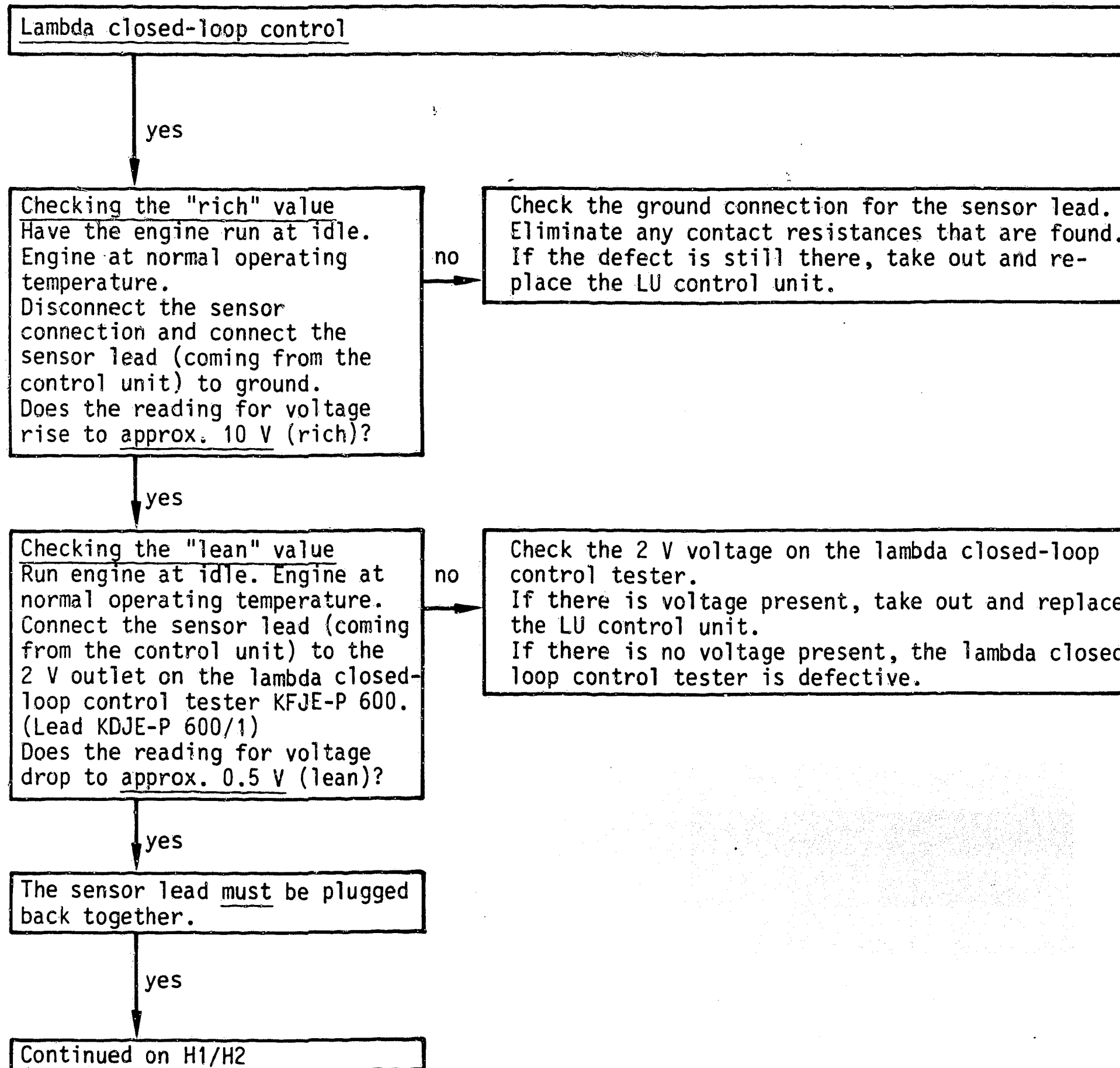




1=Lambda sensor
2=Sensor connection

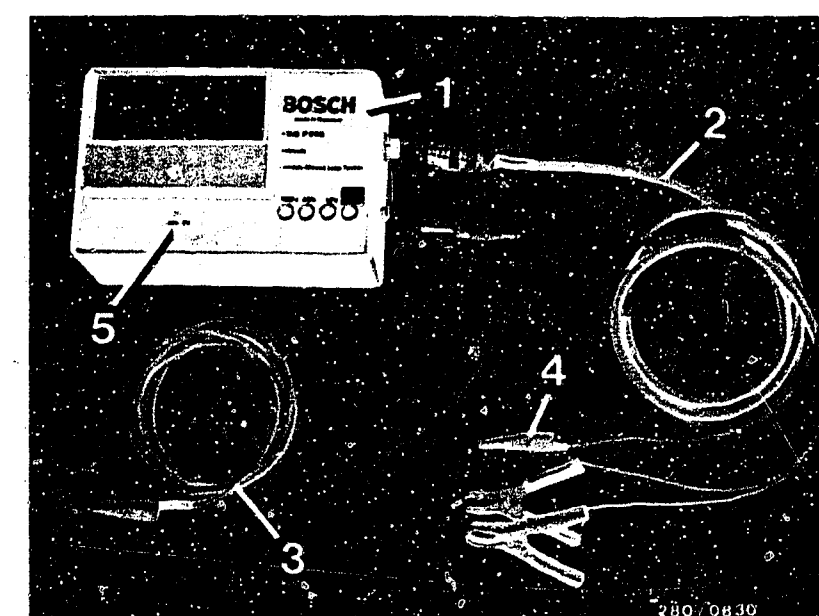
1=Adjusting screw for the integrator voltage
2=Idle speed adjusting screw





1=Lambda sensor
2=Sensor connection

1=Lambda closed-loop control tester KDJE-P 600
2=Connecting lead KDJE-P 600/51
3=Lead KDJE-P 600/1
4=Test clip at Term. 5
Diagnosis connection



Lambda closed-loop control

yes

Checking the operation of the overrun cutoff.
Run the engine at between 3000 min⁻¹ and 4000 min⁻¹ (at no load - the air conditioner must be switched off).
Take reading for voltage on the lambda closed-loop control tester.
Closed-loop control operation

Release the accelerator pedal suddenly.
Take reading for voltage →
Open-loop control operation

At reset speed, approx. 900 min⁻¹, →
Closed-loop control operation

Is it functioning properly?

no

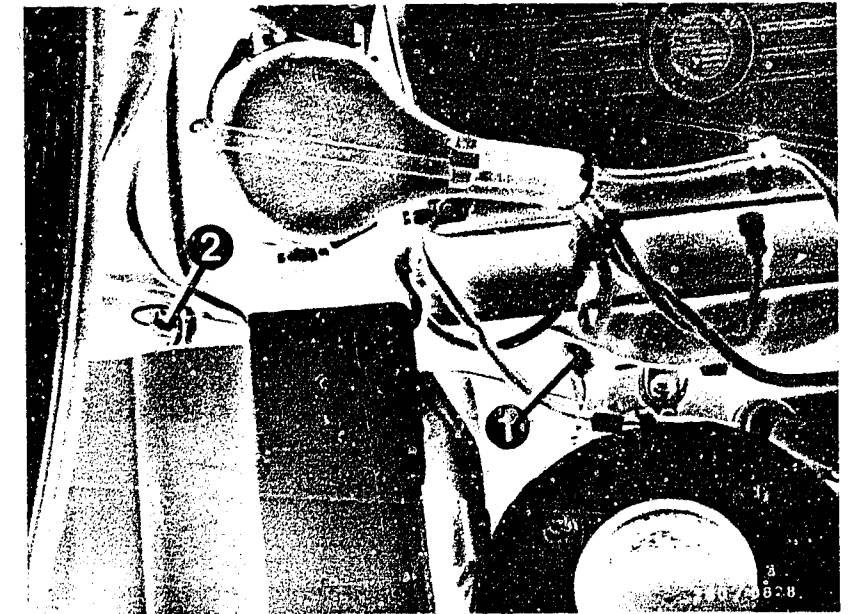
Sensor is not properly hot.
Run the engine at 3000 min⁻¹ for approx. 30 sec.
Repeat the test. Is it functioning properly?
If not, the sensor connection is not properly plugged together.
Correct any defect.
Is it functioning properly?
If not, take out and replace the LU control unit.

yes

Remove the lambda closed-loop control tester KDJE-P 600 and its connecting leads from the engine compartment. Restore all cable connections. Restore the original installation conditions. After adjustment, install a new anti-tamper device (lead seal) on the air-flow sensor (Part No. 1 283 123 004).
Testing of the lambda closed-loop control using the lambda closed-loop control tester KDJE-P 600 has been completed.

Other possible defects:

- The customer complaint has been incorrectly identified. (See Coordinates C3...C8).
If the defect has not been identified using the "Targeted trouble-shooting", see "Detailed trouble-shooting". (Coordinates C3/C4).
- The engine is not O.K. mechanically (compression, valve setting, valve timing, wear on camshaft).



1=Lambda sensor
2=Sensor connection

H1

Lambda closed-loop control
BMW 318i, 518i



H2

Lambda closed-loop control
BMW 318i, 518i



POOR THROTTLE TAKE-UP

Trouble-shooting program according to customer complaint

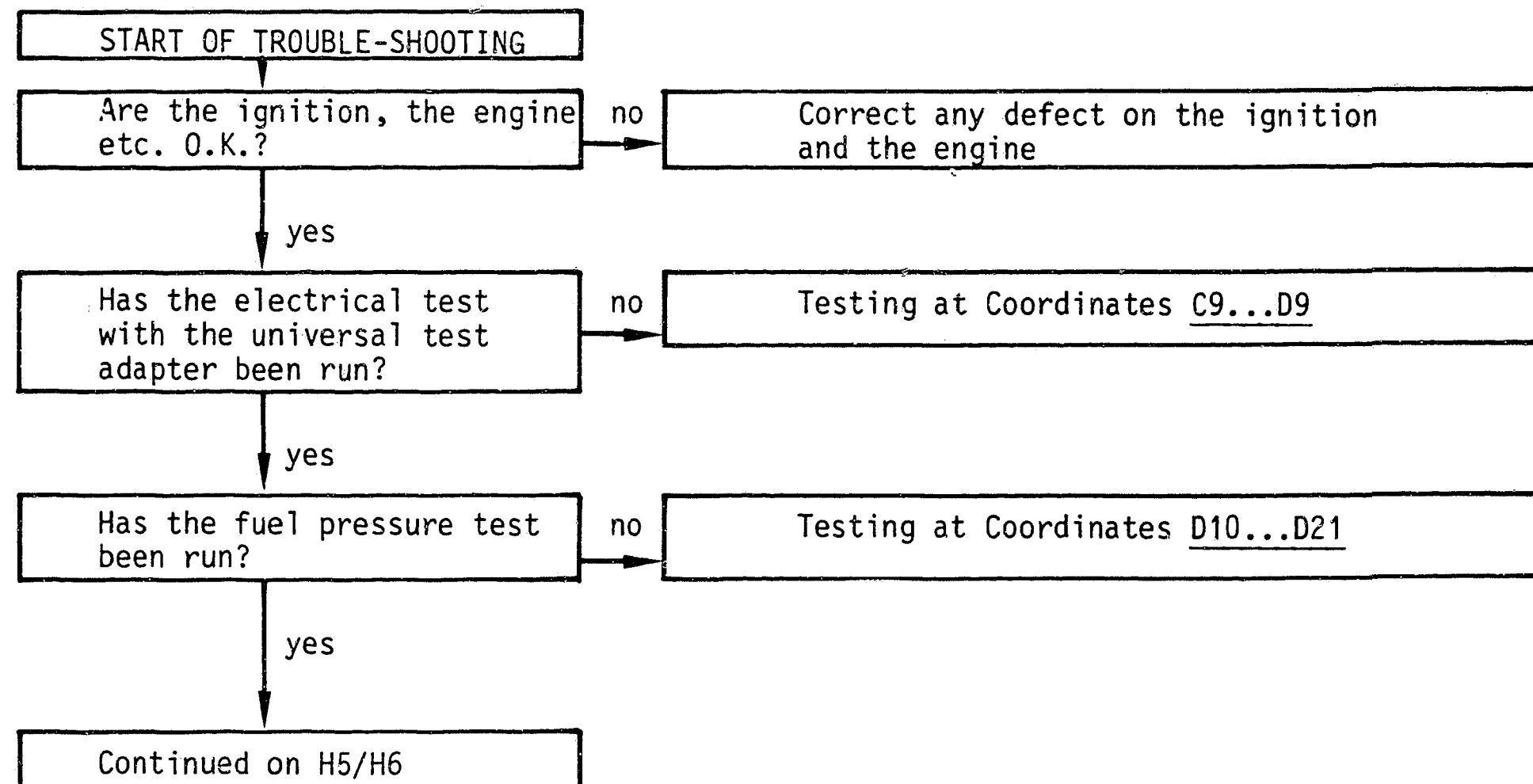
How to use the trouble-shooting program

Testing has been organized into 3 columns of boxes:

- The column at the left contains the questions for the tests being run.
- The column at the center describes the component tests and settings.
- The column at the right shows the figures belonging to the text and the legend for those figures.

If the questions can be answered clearly with "yes" even before testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no" and a defect is suspected, you must shift to the column of boxes at the center and run the tests indicated there. On completion of the testing, the trouble-shooting is continued at that point at which the shift was made.



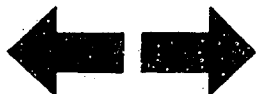
H3

Poor throttle take-up
BMW 318i, 518i



H4

Poor throttle take-up
BMW 318i, 518i



Poor throttle take-up (continued)

Is the throttle valve closed?

- Does the throttle valve lever strike against the stop screw?
- Is the accelerator cable free of stress?
- Is the accelerator cable free of kinking?

no

- Testing:
If the throttle valve is correctly adjusted, there must be a gap present between the housing and the throttle valve. The vacuum holes must be free.
- Throttle valve setting:
Adjust the throttle valve gap by turning the throttle valve stop screw. There must be a gap! After completion of adjustment, secure the screws with locking paint.
- If the accelerator cable is kinked, take it out and replace it.

yes

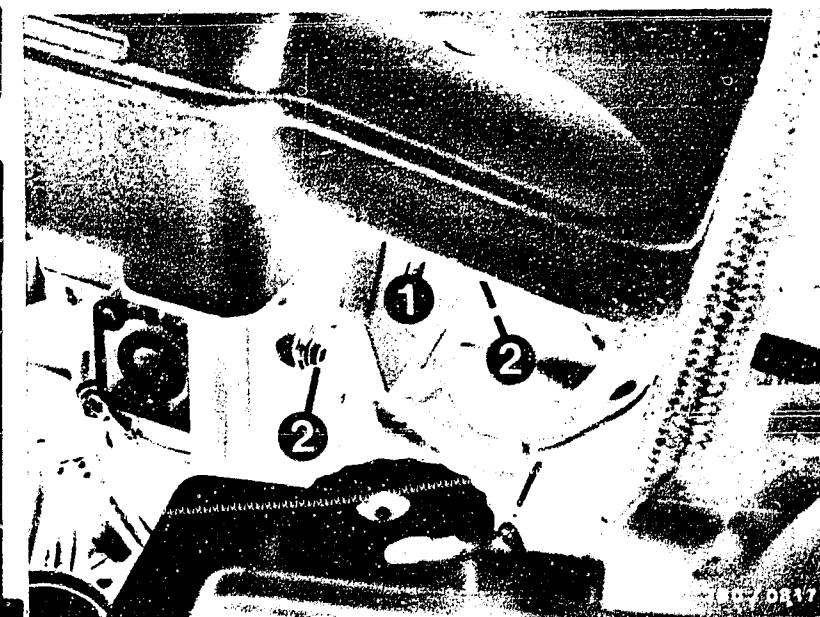
- Has the throttle valve switch been correctly set?
- Does the idle contact close?
- Does the microswitch click audibly?

no

- Adjustment of the throttle valve switch
Release the fastening screws on the throttle valve switch somewhat. Connect an ohmmeter to the throttle valve switch between Term. 2 and Term. 18. Turn the throttle valve switch far enough to the right so that the idle contact closes. (The microswitch clicks audibly). Reading 0 Ω .
- Checking the setting:
Pull on the accelerator cable slightly. The idle contact opens. (The microswitch clicks audibly.) Reading $\infty\Omega$.

yes

Continued on H7/H8



1=Throttle valve switch
2=Fastening screws

H5

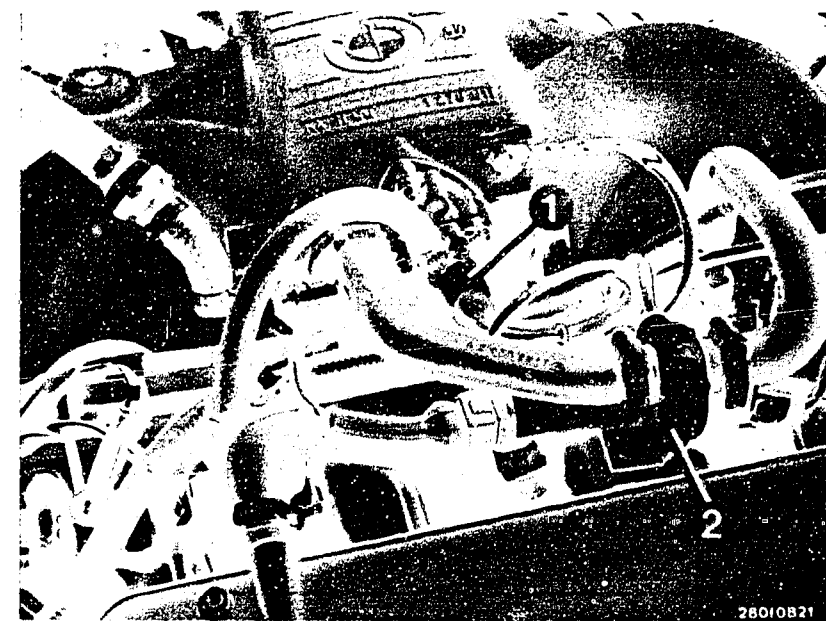
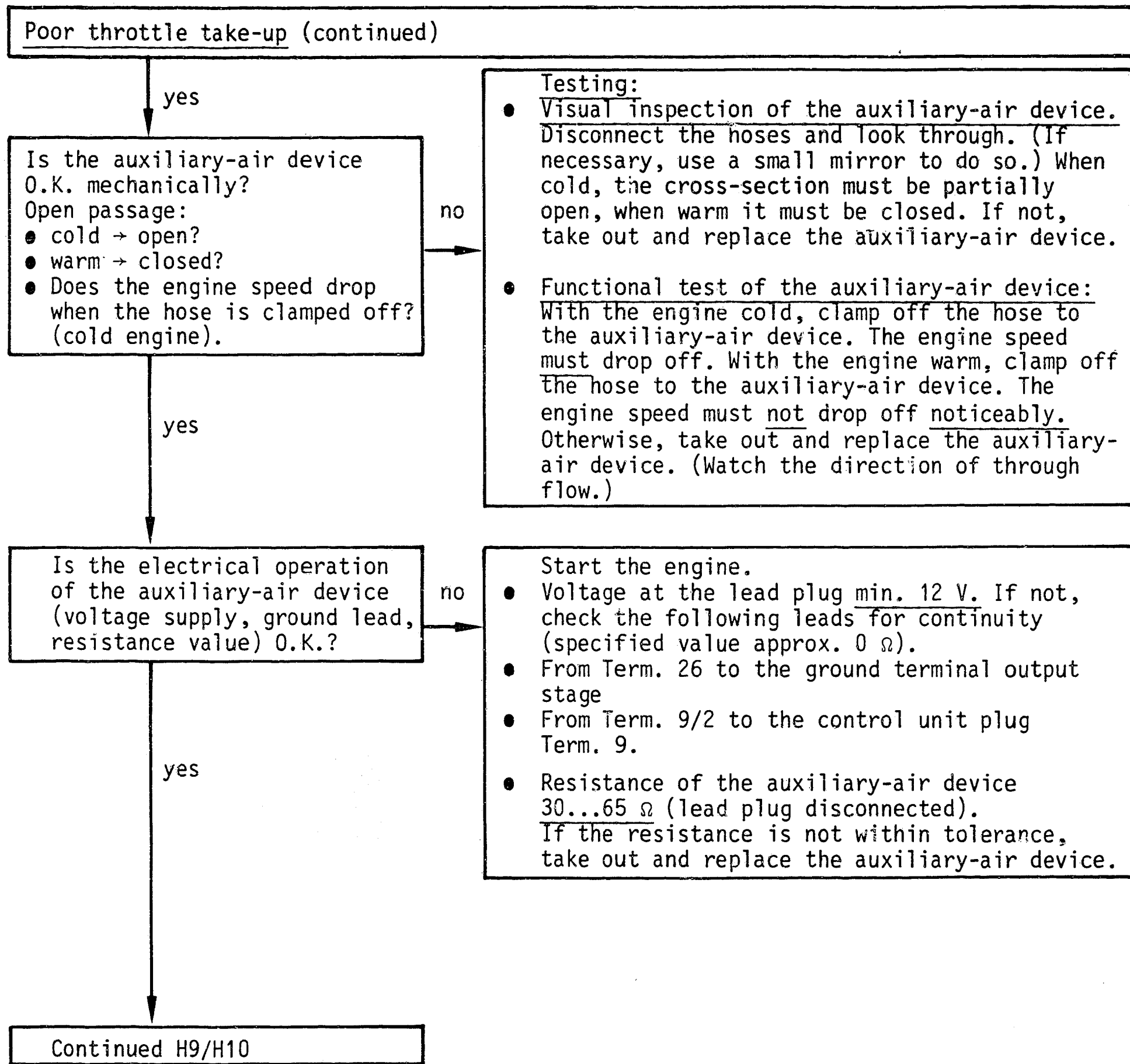
Poor throttle take-up
BMW 318i, 518i



H6

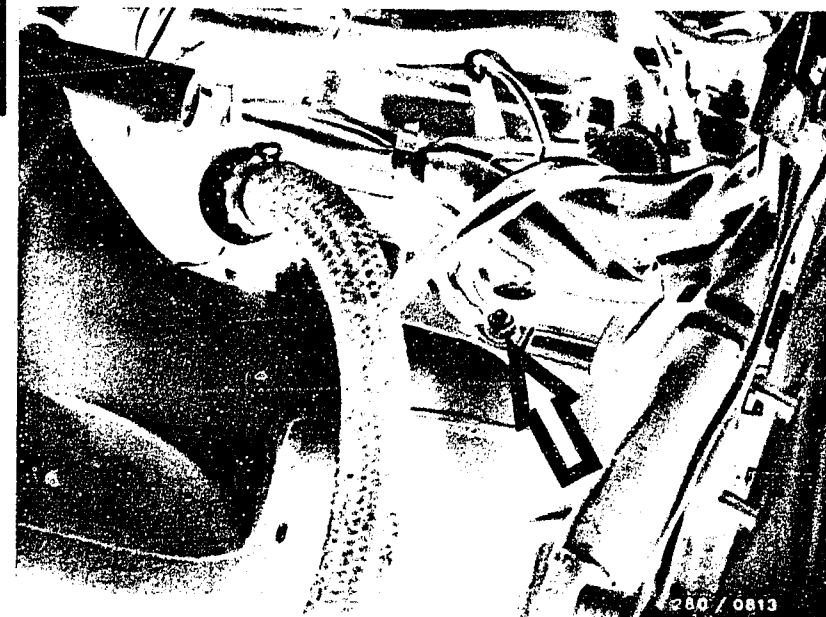
Poor throttle take-up
BMW 318i, 518i





2=Auxiliary-air device

Arrow=Ground terminal, output stage



H7

Poor throttle take-up
BMW 318i, 518i



H8

Poor throttle take-up
BMW 318i, 518i



Poor throttle take-up (continued)

yes

Is the air-flow sensor mechanically and electrically O.K.?

Is the resistance within tolerance?

Between Term. 8 and Term. 9:
160...300 Ω

Between Term. 7 and Term. 5
(deflect air-flow sensor flap):

60...1000 Ω

no

Testing:

Release the clamps on the air filter.

Lift off the upper portion of the air filter.

- Check the air-sensor flap for easy movement.

Open the air-flow sensor flap manually. It must be uniformly easy to open the air-flow sensor flap as far as the stop, and the flap must then close again as far as the stop by itself. The air-flow sensor flap must not stick when opening.

- Check the air-flow sensor mechanically.

Watch for signs of grinding. If the air-flow sensor is very dirty inside, clean it and rub it out with a lint-free cloth. If there are signs of grinding, the air-flow sensor must be taken out and replaced.

The air-flow sensor flap must return to the at-rest position. If not, the stopper or the air-flow sensor flap is bent out of shape. The air-flow sensor must be taken out and replaced.

- Check resistances

Connect an ohmmeter to Term. 8 and Term. 9 on the air-flow sensor.

Test specification: 160...300 Ω

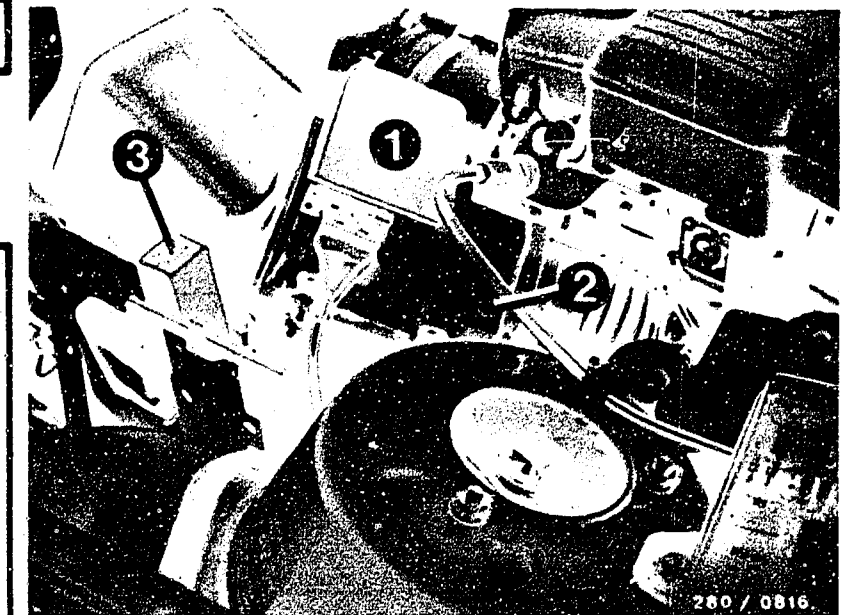
Connect an ohmmeter to Term. 7 and Term. 5 of the air-flow sensor.

Deflect the air-flow sensor flap.

Test specification: 60...1000 Ω

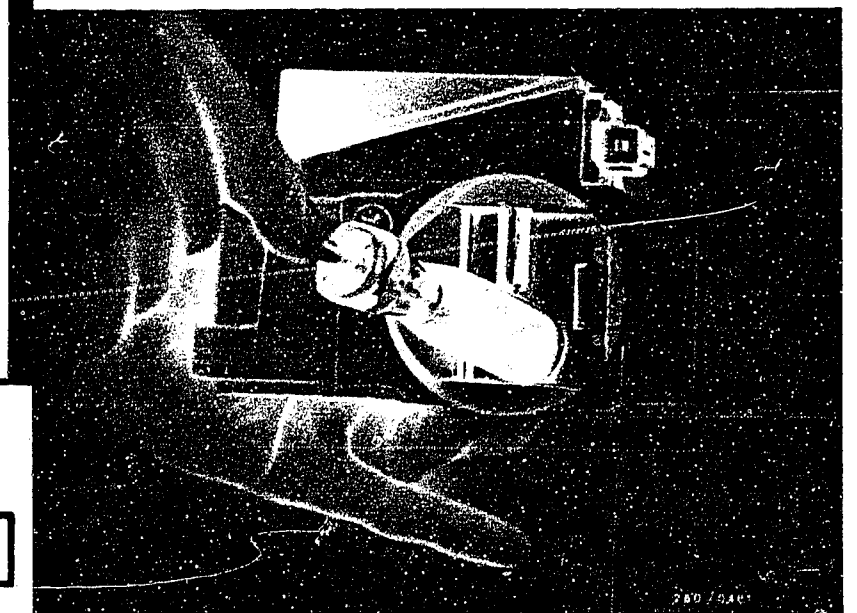
N. B.!

On completion of the test, the air filter and the air-flow sensor must be put back together.



1=Air-flow sensor
2=CO-adjusting screw

Pressing on the sensor flap in the air-flow sensor



Continued on H15/H16

Continued on H11/H12

H9

Poor throttle take-up
BMW 318i, 518i



H10

Poor throttle take-up
BMW 318i, 518i



Poor throttle take-up (continued)

Potentiometer test: (Noise test).

- Take out the air-flow sensor. (Release the clamp on the air filter, lift off the top portion of the air filter, release the fastening screws for the air-flow sensor, and leave the connection plug plugged on.) Set the motortester at the special input and using the special cable, connect to the air-flow sensor Term. 7 (red clip) and Term. 5 (black clip).
- Fabricate the adapter lead:
User-fabrication: Two leads approx. 1 m long, approx. 1.0 mm² cross-section. 2 test prods are fastened at one end. Remove insulation for approx. 2 cm at the other end, and using the clamps, clamp to the special input connection lead.

N. B.!

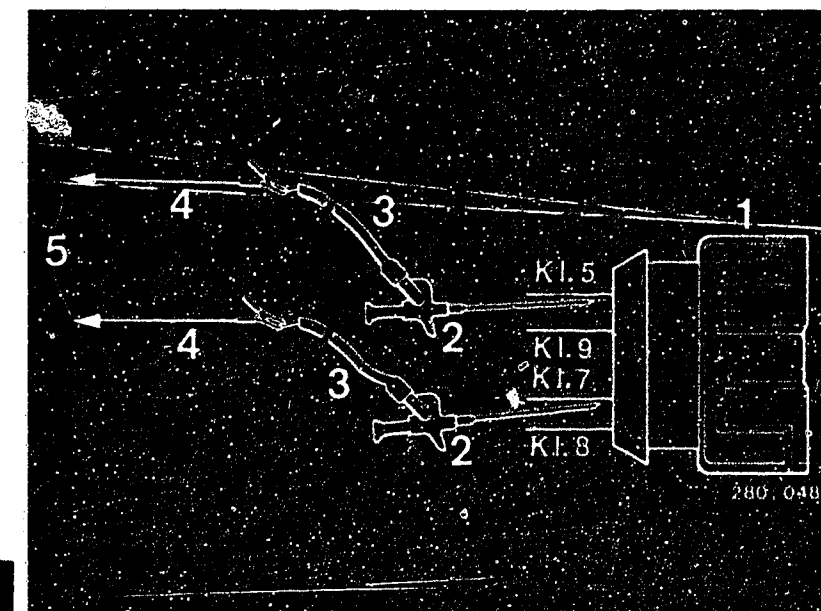
Insulate bare connection points on the adapter lead. (Danger of short-circuit). Measure carefully into the connection plug of the air-flow sensor. Do not bend any plug springs out of shape.

- Place the control lever for adjustment of the picture on the motortester at the stop at the left (calibrated setting). Disconnect the control relay. Insert a jumper cable between Term. 87 and Term. 30 in the connection socket. (Voltage supply for the control unit).

yes

Continued on H15/H15

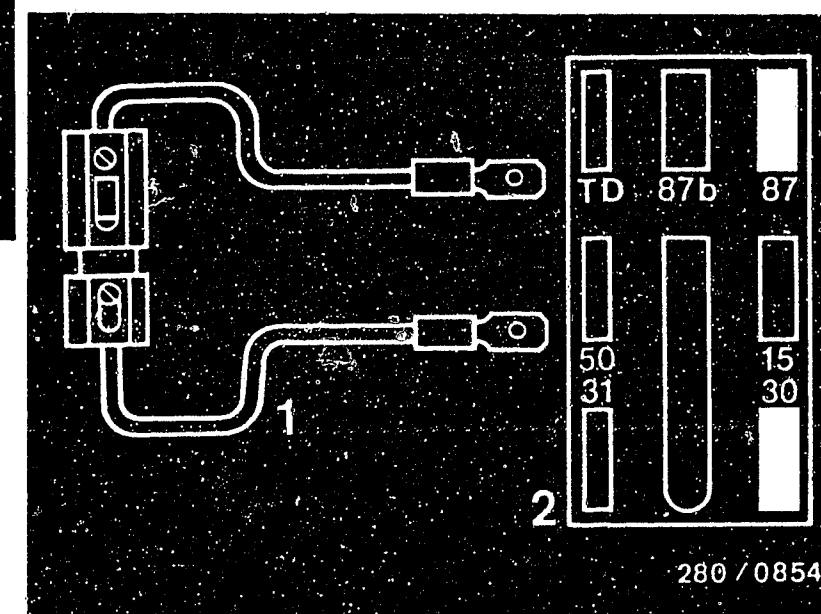
Continued on H13/H14



Kl.=Term.

- 1=Air-flow sensor connection plug
- 2=Terminal test prod
- 3=Adapter lead (user-fabricated)
- 4=Connection lead for special input
- 5=Special input on motortester

- 1=Jumper cable with fuse holder and 10 A fuse (user-fabricated)
- 2=Top view of connection socket (US model similar)



H11

Poor throttle take-up
BMW 318i, 518i



H12

Poor throttle take-up
BMW 318i, 518i



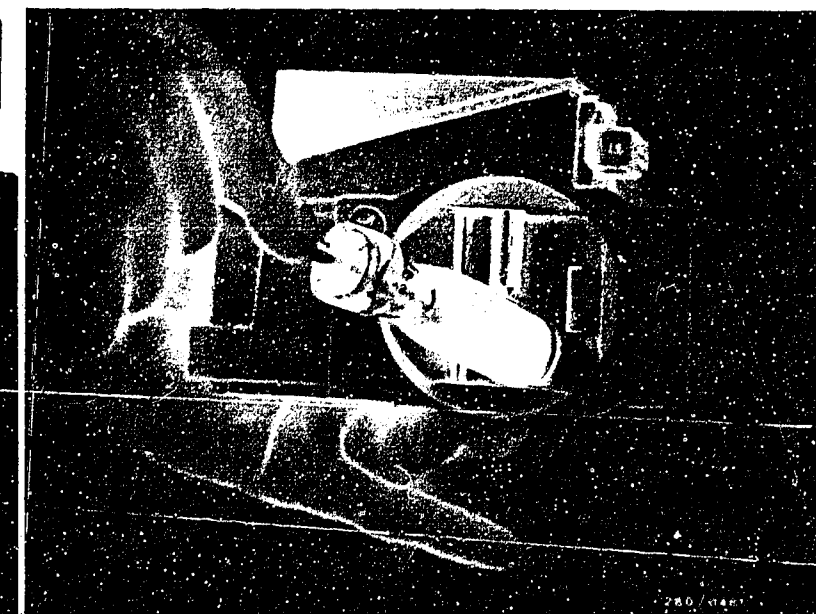
Poor throttle take-up (continued)

- Deflect the sensor flap of the air-flow sensor several times suddenly. If the air-flow sensor is good, a stroke signal without dips must appear on the oscilloscope. If the air-flow sensor is defective, a noise signal similar to that shown at the right appears. Take out and replace the air-flow sensor. Disconnect the adapter lead after the test and put on the rubber grommet properly. Put the air-flow sensor on. Put on all hoses and tighten them (leaks).

N. B.! After the test, the jumper cable must be pulled out and the control relay must be plugged in.

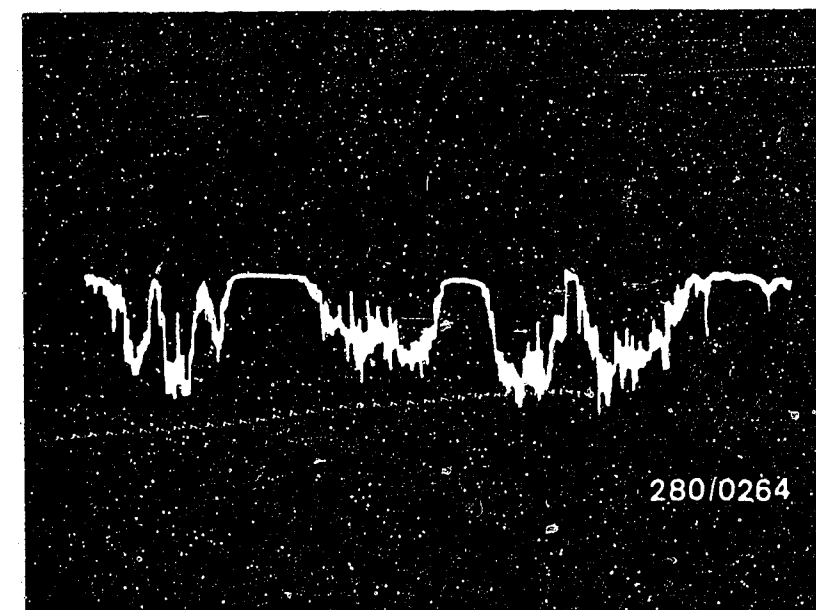
yes

Continued On H15/H16



Pressing on the sensor flap in the air-flow sensor.

Noise signal if air-flow sensor is defective



H13

Poor throttle take-up
BMW 318i, 518i



H14

Poor throttle take-up
BMW 318i, 518i



Poor throttle take-up (continued)

Is the engine free of bucking when driving off or accelerating during the warm-up phase?

no

Preconditions:

The engine, ignition, universal test adapter program, fuel pressure test, and the preceding components are O.K.

Installing a pressure switch (0 280 110 005)

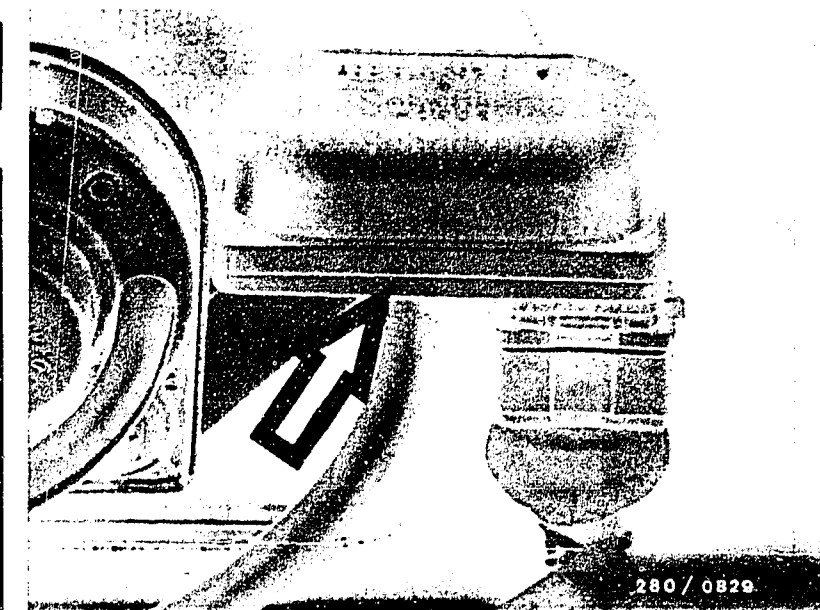
- Install the pressure switch at a location protected from splashing water.
- Make the electrical connections (see the Figure).
- Make the pneumatic connection, from the pressure switch connection to one connection on the throttle valve (intake manifold pressure).

Operation:

With certain changes in pressure in the intake manifold, the mixture is enriched somewhat for a brief time.

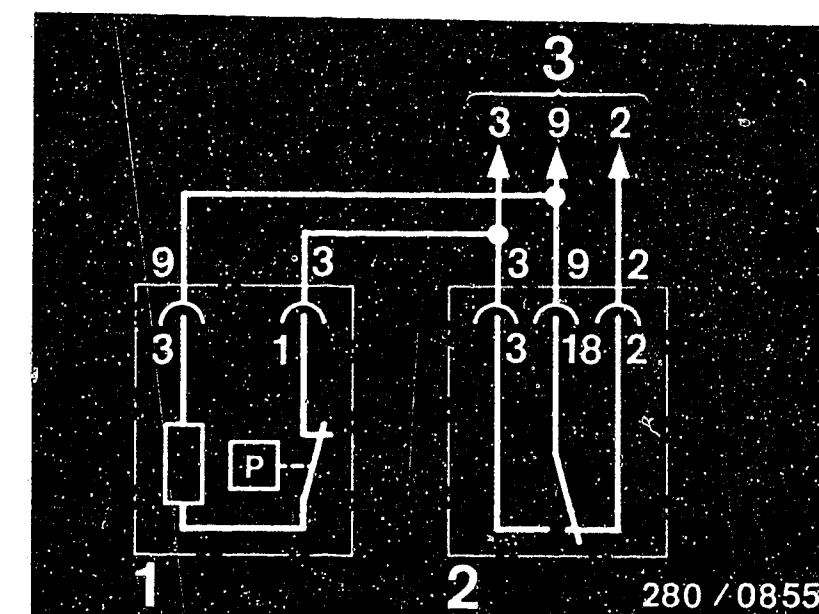
yes

Continued on H17/H18



Arrow=Pressure switch

1=Pressure switch 0 280 110 005
2=Throttle valve switch
3=to the control unit plug Term.3/9/2



H15

Poor throttle take-up
BMW 318i, 518i



H16

Poor throttle take-up
BMW 318i, 518i



Poor throttle take-up (continued)

yes

Are all hose lines and electrical lead connections put on correctly, without sharp bending or damage?
Visual inspection.
Has the air intake system been checked for leaks at 0.3 bar gauge pressure?

no

yes

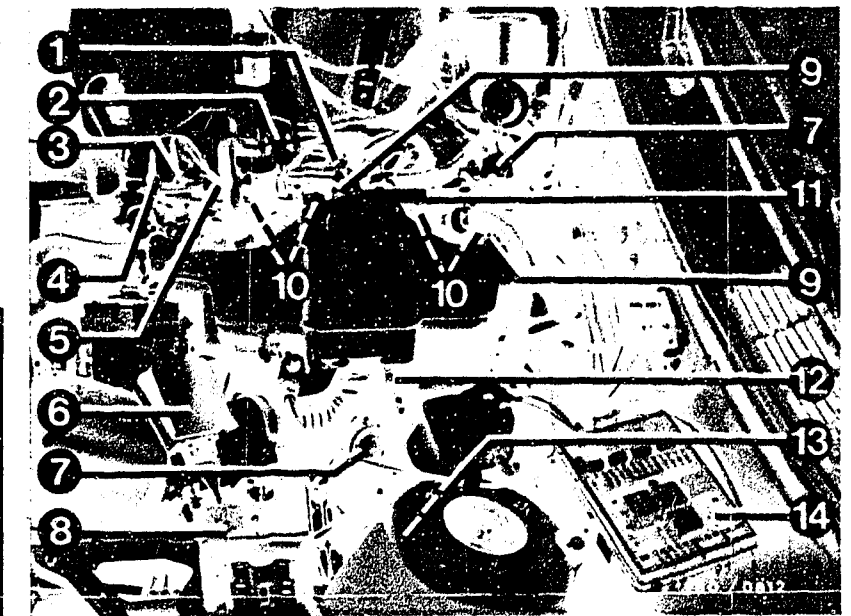
Continued on H21/H22

- Check that the hoses of the air-intake system and the fuel line system are put on correctly, without sharp bending or damage. If need be, take out and replace the hoses. Eliminate leaks using new seals or by tightening the connection screws.

- Testing for leaks:

Seal off the exhaust pipe. Release the clamps at the air filter. Lift off the top part of the air filter and seal the air-flow sensor channel. Disconnect the hose after the auxiliary-air device and, using a compressed air gun, blow air (0.3 bar gauge pressure) into the intake manifold. Seal off the auxiliary-air device connection. In so doing, open the throttle valve completely. Using soapy water, spray or brush on all seal locations. Leaks can also occur at the following points on the engine: The oil dipstick has not been inserted firmly, the cover seal for the oil filling pipe is defective, etc. Bubbling or foaming indicates leaks.

Continued on H19/H20



- 1=Electric starting valve
- 2=Auxiliary-air device
- 3=NTC II
- 4=Thermotime switch
- 5=Pressure regulator
- 6=Air-flow sensor
- 7=Fuel-line-pressure damper
- 8=Control relay
- 9=Ground terminals
- 10=Electric fuel-injection valves
- 12=Throttle valve switch

H17

Poor throttle take-up
BMW 318i, 518i



H18

Poor throttle take-up
BMW 318i, 518i



Poor throttle take-up (continued)

yes

Continued on H21/H22

Model for Sweden/Switzerland:

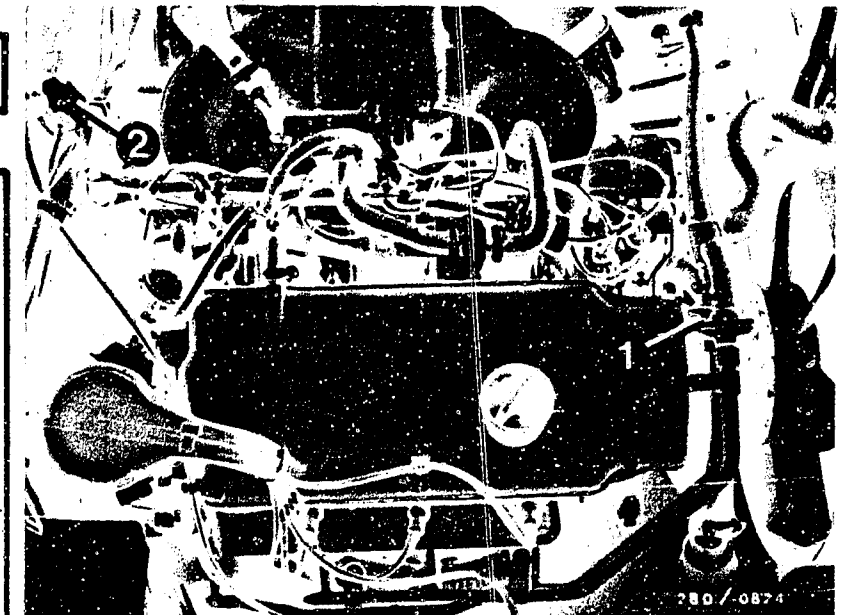
The secondary air induction system has been installed here as an additional measure to reduce the toxic substances in the exhaust gas.

- Testing for leaks:
In addition, the lines for the secondary air induction system and the air valves must be checked.

Model for the US:

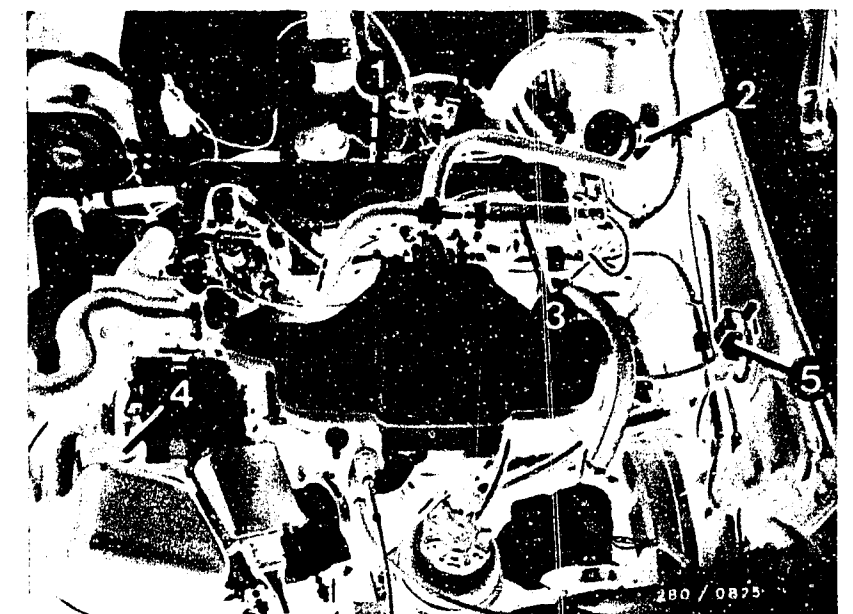
Because of the strict exhaust gas regulations in the USA, a lambda closed-loop control with a 3-bed catalytic convertor must be installed in these engines. In addition, the USA model has an idle actuator instead of the auxiliary-air device, i.e., an idle speed control built by VDO.

- Testing for leaks:
In addition, the hoses for the idle speed control system must be checked.



Model for Sweden/Switzerland
1=natural aspiration air valves
2=Solonoid-operated valve

Model for US
1=Lambda sensor
2=Sensor connection
3=Idle actuator (VDO)
4=Pressure sensor (altitude sensor)
5=Solonoid-operated valve



H19

Poor throttle take-up
BMW 318i, 518i



H20

Poor throttle take-up
BMW 318i, 518i



Poor throttle take-up (continued)

yes

Have the CO and idle speed been correctly set?
(only for the model for EU/S/
Switzerland)

Test specification:

Idle speed:

800...900 min⁻¹

CO-level

Europe: less than 1.0 vol.%CO

Model for Sweden/Switzerland:

0.2...0.4 vol. % CO

Are these test specifications
being met?

no

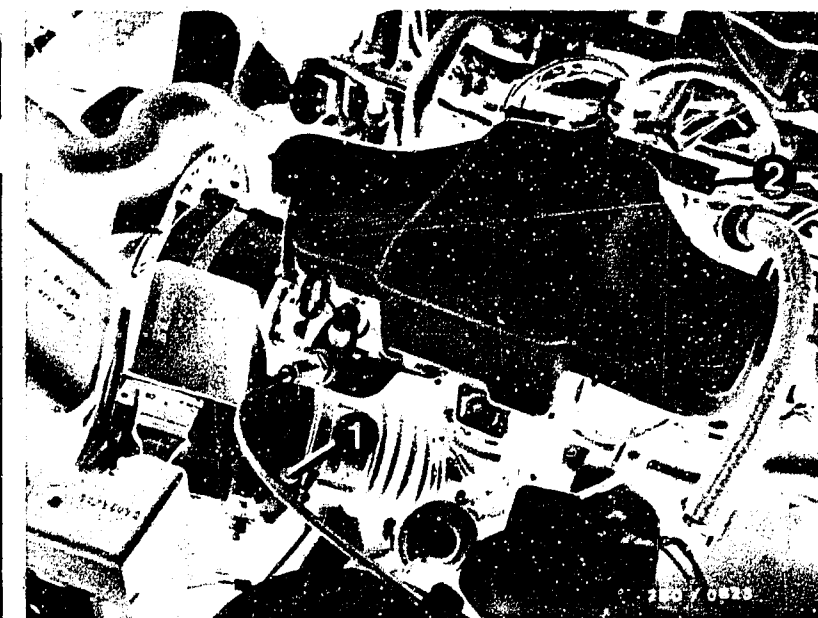
- Adjustment of CO and idle speed
 - Exhaust gas adjustment using the exhaust analyzer with engine at normal operating speed and at idle speed. For duration of the exhaust gas measurement and adjustment, switch the exhaust gas system off.
- Idle speed:
 - Manual transmissions and automatic transmissions (in "Park"):
800 ... 900 min⁻¹
- CO-adjustment:
 - Model for Europe: less than 1.0 vol.%CO
 - Model for Sweden/Switzerland:
A secondary-air induction system is installed in these vehicles because of certain exhaust gas regulations.
- Test specification:
 - CO-setting 0.2...0.4 vol.%CO (with hose on the air valves).
- Setting if there is a defect:
 - CO-setting 0.3...1.0 vol.%CO with the air valve hose taken off and sealed.
- When adjusting the idle speed and CO, in-activate the secondary air induction system. To do this, disconnect the hose between the air valve and the air filter at the air filter (arrow) and seal it tightly with a plug. When operating the vehicle in countries without more stringent exhaust gas regulations, it is not necessary to inactivate the secondary-air induction system.

yes

Idle speed cannot be adjusted.

yes

Continued on H23/H24

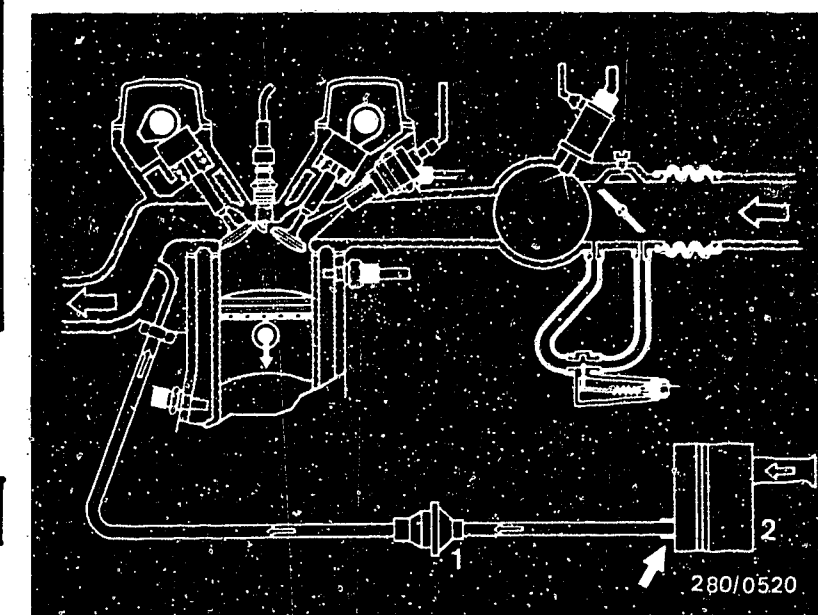


1=CO-adjusting screw

2=Idle-speed adjusting screw

1=Air valve (non-return valve)

2=Air filter



H21

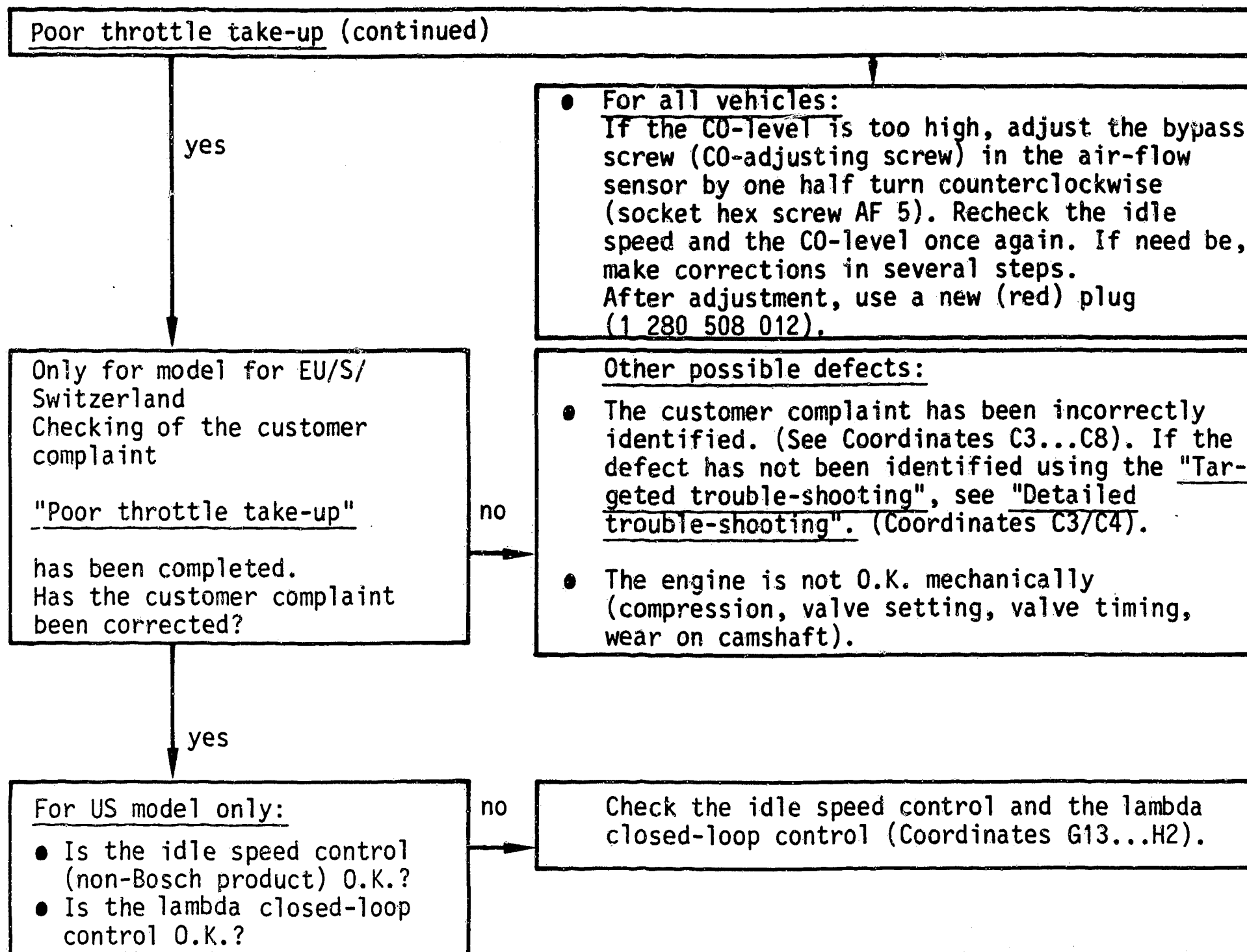
Poor throttle take-up
BMW 318i, 518i



H22

Poor throttle take-up
BMW 318i, 518i





ENGINE MISSING IN ALL DRIVING CONDITIONS

Trouble-shooting program according to customer complaint

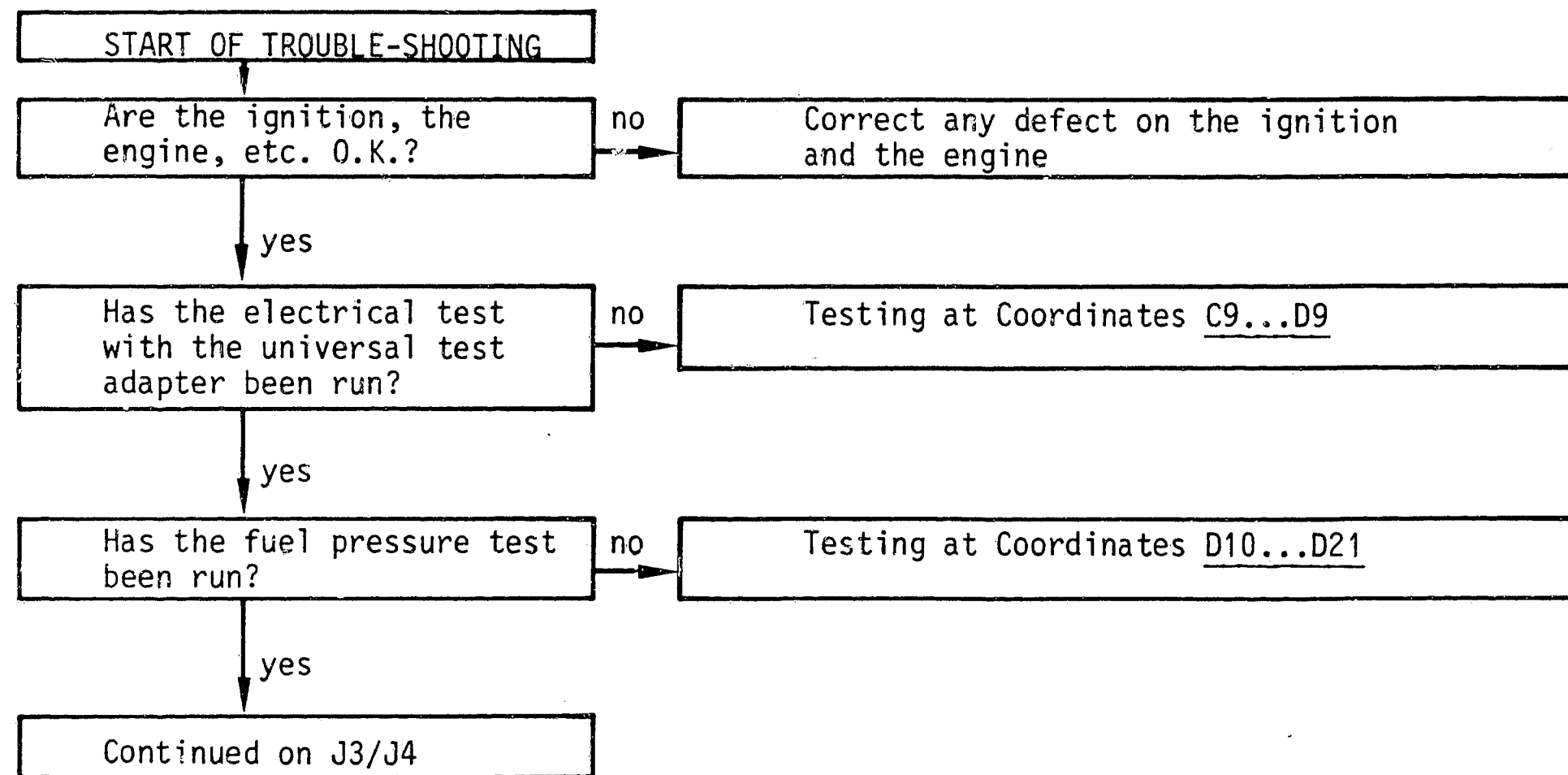
How to use the trouble-shooting program

Testing has been organized into 3 columns of boxes:

- The column at the left contains the questions for the tests being run.
- The column at the center describes the component tests and settings.
- The column at the right shows the figures belonging to the text and the legend for those figures.

If the questions can be answered clearly with "yes" even before testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no" and a defect is suspected, you must shift to the column of boxes at the center and run the tests indicated there. On completion of the testing, the trouble-shooting is continued at that point at which the shift was made.



J1

Engine missing in all driving conditions
BMW 318i, 518i



J2

Engine missing in all driving conditions
BMW 318i, 518i



Engine missing in all driving conditions (continued)

Is the plug connection for the Jetronic wiring harness O.K.?
Loose contacts?
Ground contact?

yes

no

Check all plug connections for correct seat and for corrosion. Make certain there is a good ground connection. (Terminals 5, 38, 13, 26, and 56).

yes

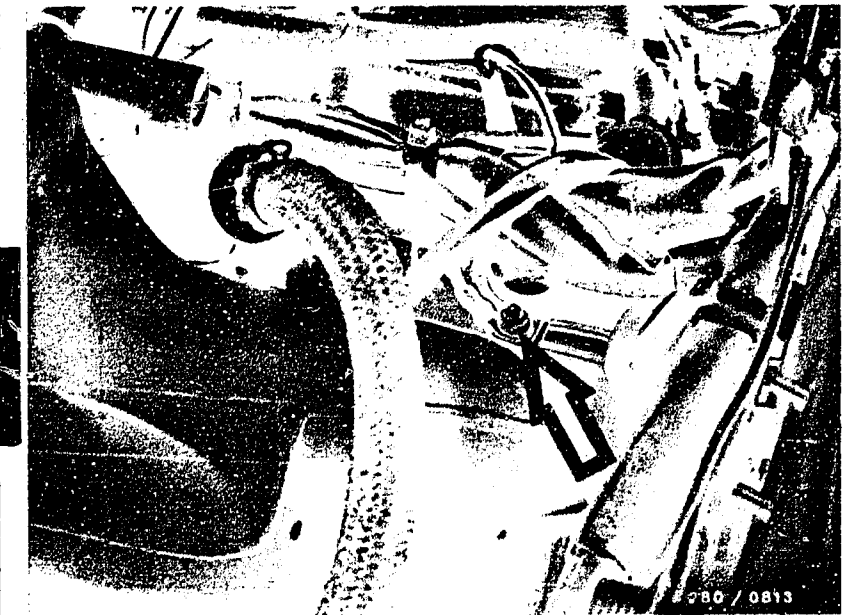
Are the alternator and regulator O.K.?
(Engine missing due to voltage peaks).

no

- Connect the test lead as follows:
The 2-pole plug connections for the test lead are connected between an electric fuel-injection valve and its connecting lead. Only one of the other two connecting terminals of the test lead needs be connected to the special input on the motortester.
When connected correctly, the pattern shown at the right appears on the oscilloscope. Using the test lead, it is possible to check the fuel-injection pulses on the electric fuel-injection valves while the engine is running, using an ignition oscilloscope. If the pattern at the right is not obtained, or if deviations can be seen (interference, missing, etc.), the other electric fuel-injection valves should also be examined.
- With the engine shut off, disconnect the plug from the alternator. Start the engine. If the missing has been eliminated, check the alternator and regulator. Voltage peaks appear on the ignition oscilloscope.
- If there is interference: check how the leads have been laid.
- If there is missing: eliminate loose contacts in the leads or in the plug connections.

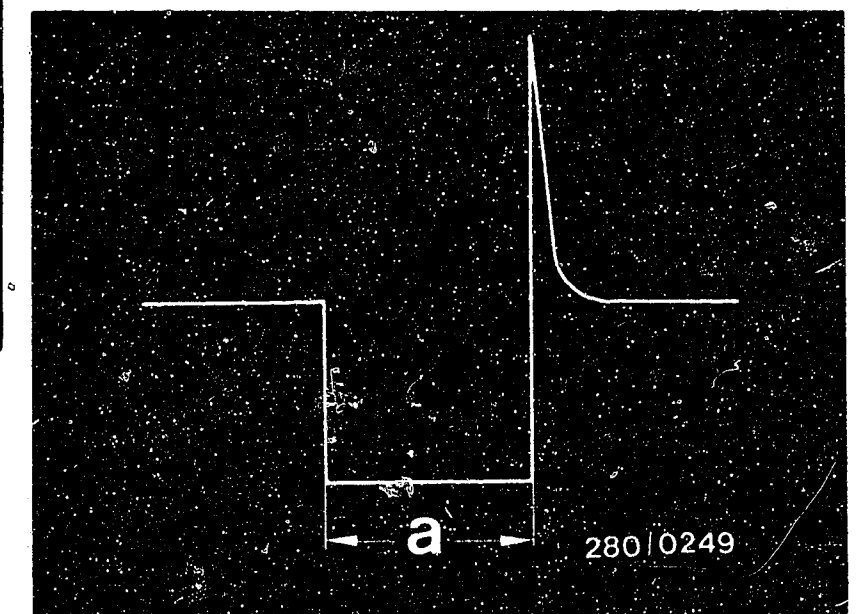
yes

Continued on J7/J8



Arrow=Ground terminal, output stage

Fuel-injection pulses of a connected output stage (measured on the electric fuel-injection valve)
a=Pulse length (dependent on the engine load)



J3

Engine missing in all driving conditions
BMW 318i, 518i



J4

Engine missing in all driving conditions
BMW 318i, 518i



Engine missing in all driving conditions (continued)

yes

Is the air-flow sensor
mechanically and electrically
O.K.?

no

Is the resistance within
tolerance?

Between Term. 8 and Term. 9:

160...300 Ω

Between Term. 7 and Term. 5

(deflect air-flow sensor flap):

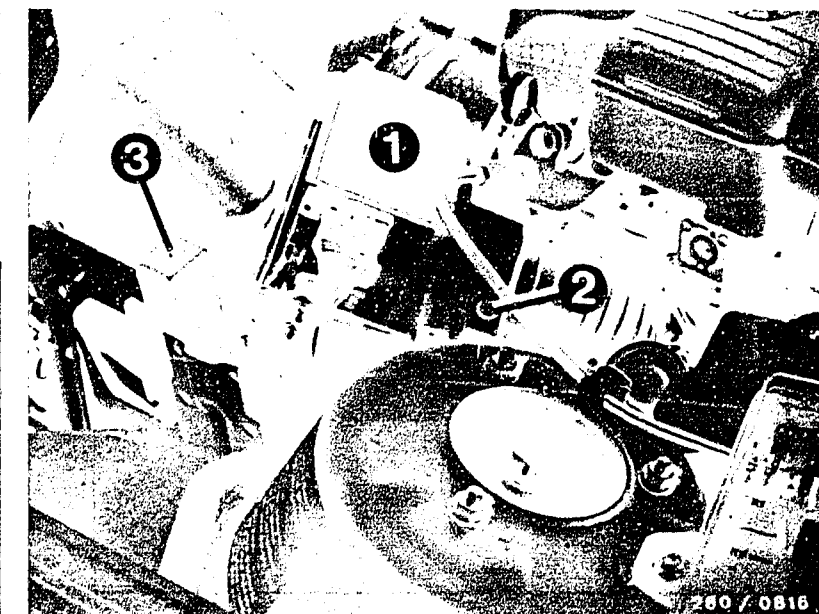
60...1000 Ω

yes

Testing:

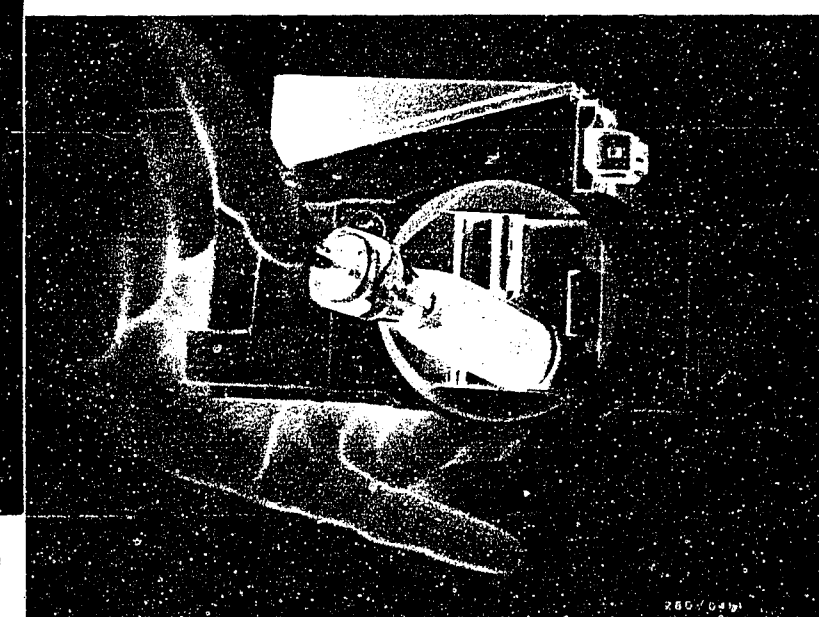
Release the clamps on the air filter.
Lift off the upper portion of the air filter.

- Check the air-sensor flap for easy movement
Open the air-flow sensor flap manually. It must be uniformly easy to open the air-flow sensor flap as far as the stop, and the flap must then close again as far as the stop by itself. The air-flow sensor flap must not stick when opening.
- Check the air-flow sensor mechanically
Watch for signs of grinding. If the air-flow sensor is very dirty inside, clean it and rub it out with a lint-free cloth. If there are signs of grinding, the air-flow sensor must be taken out and replaced.
The air-flow sensor flap must return to the at-rest position. If not, the stopper or the air-flow sensor flap is bent out of shape. The air-flow sensor must be taken out and replaced.
- Check resistances
Connect an ohmmeter to Term. 8 and Term. 9 on the air flow sensor.
Test specification: 60...300 Ω
Connect an ohmmeter to Term. 7 and Term. 5 of the air-flow sensor.
Deflect the air-flow sensor flap.
Test specification: 60...1000 Ω
N. B.!
On completion of the test, the air filter and the air-flow sensor must be put back together.



1=Air flow sensor
2=CO-adjusting screw

Pressing on the sensor flap in the
air-flow sensor



Continued on J11/J12

Continued on J7/J8

J5

Engine missing in all driving conditions
BMW 318i, 518i



J6

Engine missing in all driving conditions
BMW 318i, 518i



Engine missing in all driving conditions (continued)

- **Potentiometer test: (Noise test)**
Take out the air-flow sensor. (Release the clamp on the air filter, lift off the top portion of the air filter, release the fastening screws for the air-flow sensor, and leave the connection plug plugged on.) Set the motortester at the special input and using the special cable, connect to the air-flow sensor Term. 7 (red clip) and Term. 5 (black clip).

Fabricate the adapter lead:

User-fabrication: Two leads approx. 1 m long, approx. 1.0 mm² cross-section. 2 test prods are fastened at one end. Remove insulation for approx. 2 cm at the other end, and using the clamps, clamp to the special input connection lead.

N. B.!

Insulate bare connection points on the adapter lead. (Danger of short-circuit). Measure carefully into the connection plug of the air-flow sensor. Do not bend any plug springs out of shape.

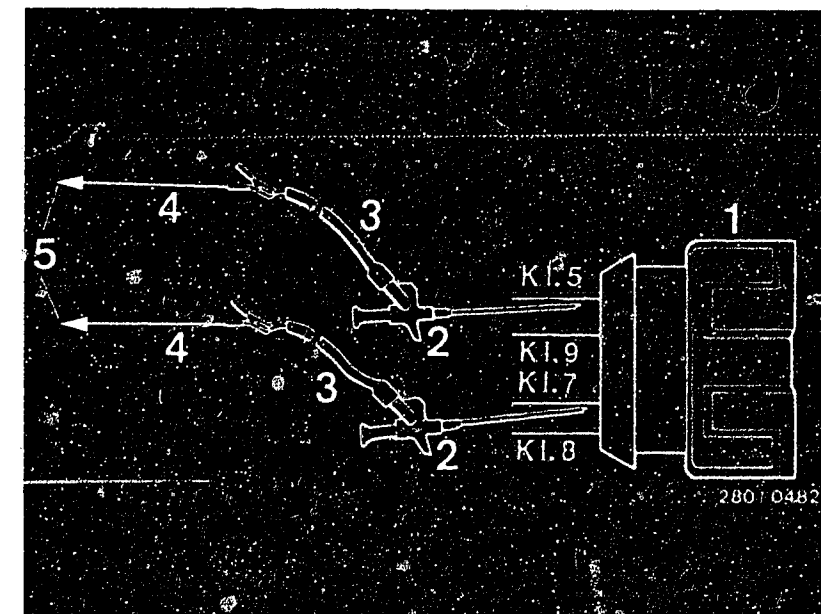
Place the control lever for adjustment of the picture on the motortester at the stop at the left (calibrated setting).

- Disconnect the control relay. Insert a jumper cable between Term. 87 and Term. 30 in the connection socket. (Voltage supply for the control unit).

yes

Continued on J11/J12

Continued on J9/J10



K1.=Term.

1=Air-flow sensor connection plug

2=Terminal test prod

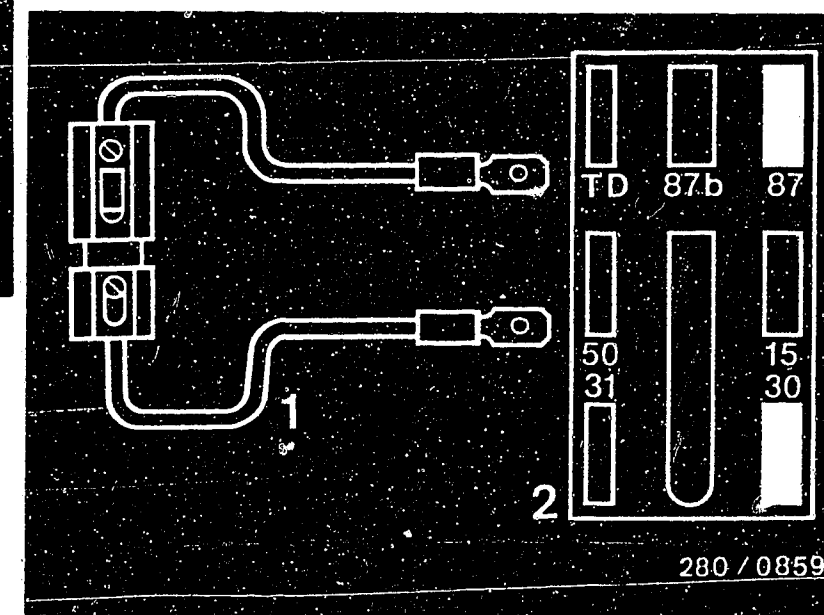
3=Adapter lead (user-fabricated)

4=Connection lead for special input

5=Special input on motortester

1=Jumper cable with fuse holder and 10 A fuse (user-fabricated)

2=Top view of connection socket (US model similar)



J7

Engine missing in all driving conditions
BMW 318i, 518i



J8

Engine missing in all driving conditions
BMW 318i, 518i



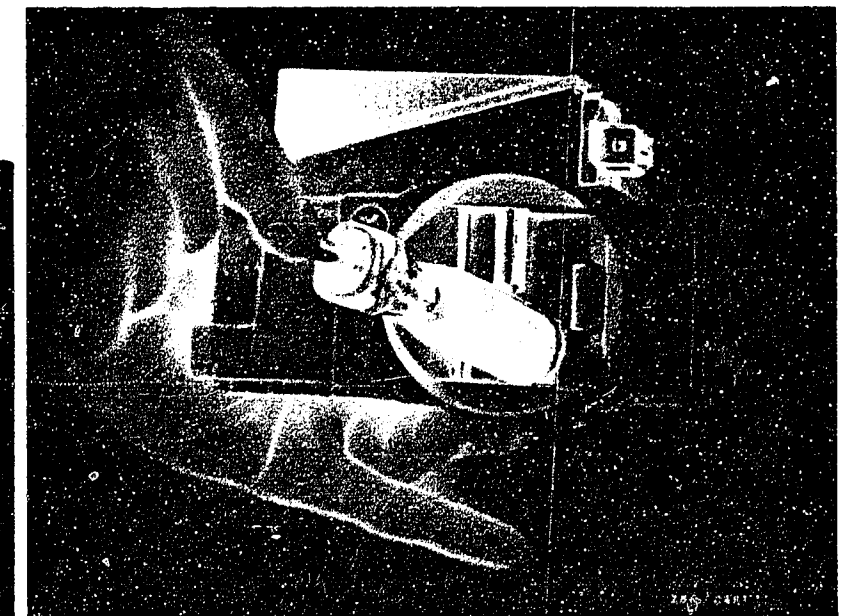
Engine missing in all driving conditions (continued)

- Deflect the sensor flap of the air-flow sensor several times suddenly. If the air-flow sensor is good, a stroke signal without dips must appear on the oscilloscope. If the air-flow sensor is defective, a noise signal similar to that shown at the right appears. Take out and replace the air-flow sensor. Disconnect the adapter lead after the test and put on the rubber grommet properly. Put the air-flow sensor on. Put on all hoses and tighten them (leaks).

N. B.! After the test, the jumper cable must be pulled out and the control relay must be plugged in.

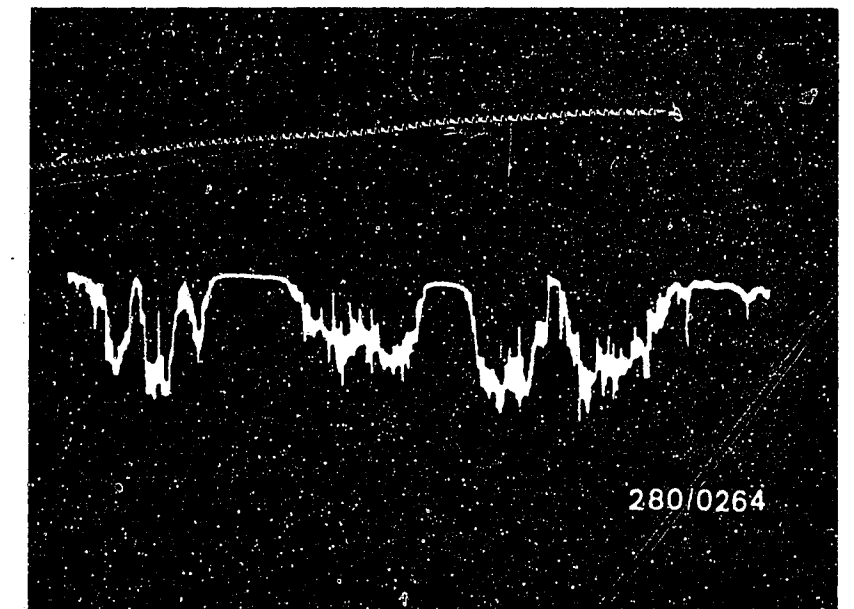
yes

Continued on J11/J12



Pressing on the sensor flap in the air-flow sensor.

Noise signal if air-flow sensor is defective



J9

Engine missing in all driving conditions
BMW 318i, 518i



J10

Engine missing in all driving conditions
BMW 318i, 518i



Engine missing in all driving conditions (continued)

yes

Is the fuel delivery from the electric fuel pump O.K.?

no

yes

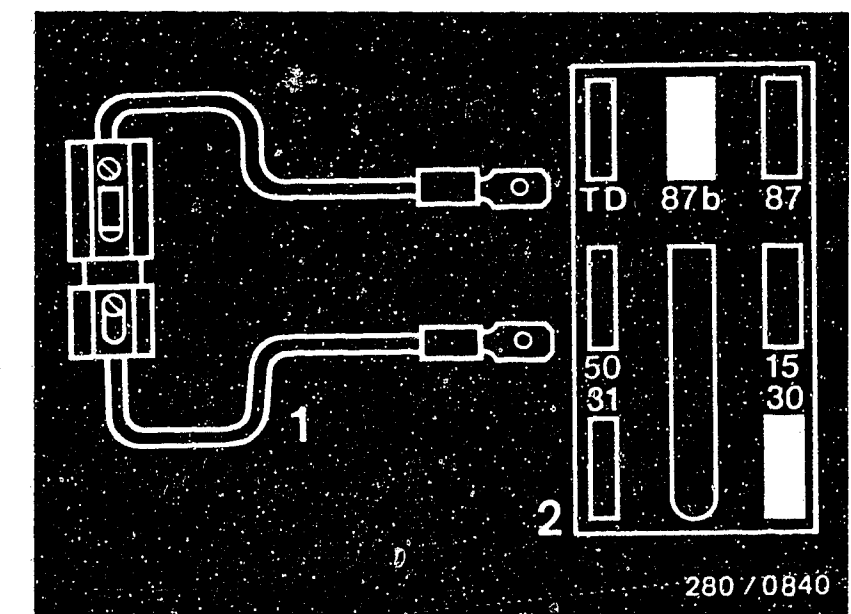
Continued on J13/J14

- Measure the fuel delivery:
 - For testing, release the connection between the fuel return hose (from the pressure regulator) and the fuel return line (to the fuel tank).
 - Extend the hose if necessary, and direct it into a 5 l container with a measuring scale.
 - Disconnect the control relay. Put a jumper cable in between Term. 87b and Term. 30 on the connection socket. The electric fuel pump must run.
- Test specification: min. 650 cm³/30 sec.
- Caution!
Be absolutely certain to remove the jumper cable after completion of the test.
- Corrective action if the test specification is not met:
- Fuel filter is clogged → take it out and replace it.
 - Voltage at the fuel pump plugs must be min. 12 V when the engine is running. If not, clean the contacts, eliminate any poor ground connection. Take out and replace the leads.
 - If the pressure regulator is defective, take it out and replace it. The pressure regulator is fastened to the distribution pipe with two fastening screws via an O-ring. After the pressure regulator has been taken out, the O-ring and the flat ring must be taken out and replaced. (Use set of parts 1 287 010 704.)
 - If the fuel pump output is too low, take out and replace the electric fuel pump. (On the left under the vehicle, near the rear axle.)



2=Fuel return line
3=Fastening screws
4=Pressure regulator

Jumper cable (user-fabricated)
1=Fuse holder with 10 A fuse
2=Top view of connection socket (US model similar)



J11

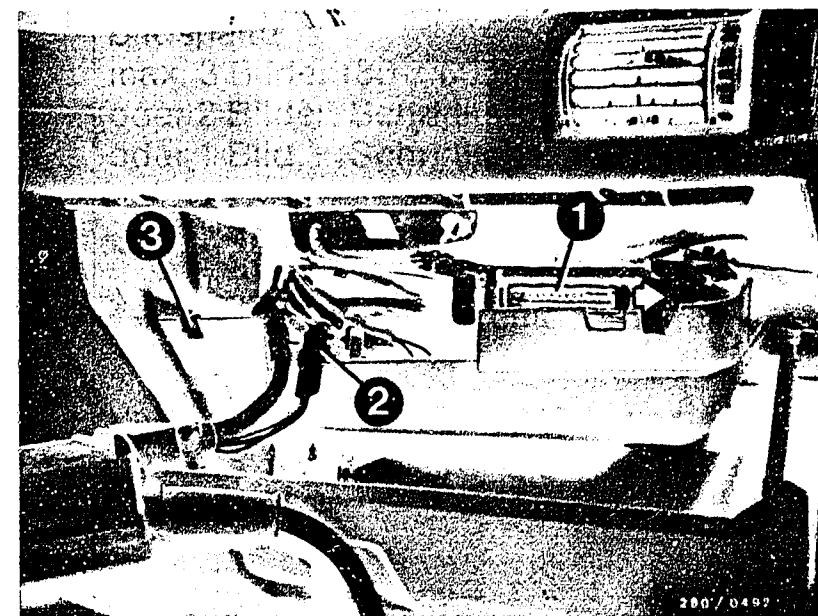
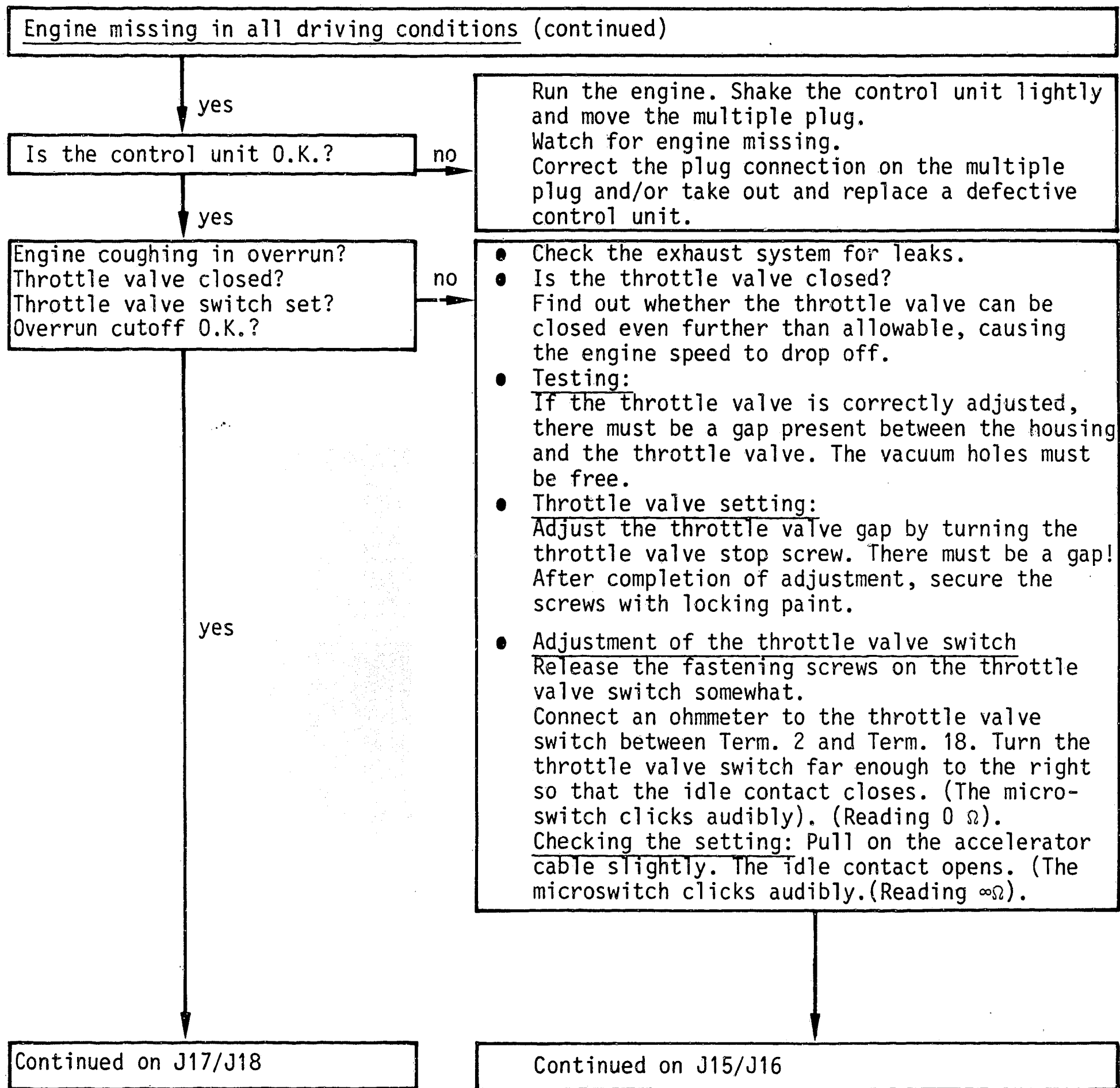
Engine missing in all driving conditions
BMW 318i, 518i



J12

Engine missing in all driving conditions
BMW 318i, 518i





1=Control unit
2=Plug connection Term. 1
(lead No. 1)
3=Fastening screws for control unit cover

1=Throttle valve switch
2=Fastening screws



J13

Engine missing in all driving conditions
BMW 318i, 518i



J14

Engine missing in all driving conditions
BMW 318i, 518i

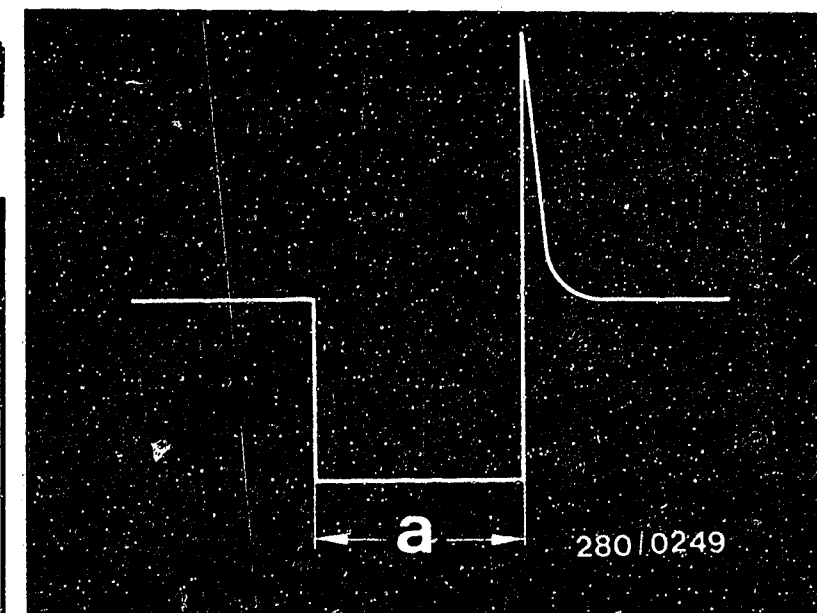


Engine missing in all driving conditions (continued)

- Check the operation of the overrun cutoff
Connect the test lead as follows: The 2-pole plug connections for the test lead are connected between an electric fuel-injection valve and its connecting lead. Only one of the other two connecting terminals of the test lead needs to be connected to the special input on the motortester. When connected correctly, the pattern shown at the right appears on the oscilloscope. Watch the oscilloscope!
Slowly accelerate the engine to 3000 min^{-1} . Fuel-injection pulses must appear on the oscilloscope. Take your foot from the accelerator pedal (idle setting). There must not be any fuel-injection pulses left.
- Check the reset speed.
Engine clearly at less than ambient temperature ($+15^{\circ}\text{C} \dots +30^{\circ}\text{C}$):
Starting from approx. 1800 min^{-1} (US model 1200 min^{-1}), fuel-injection pulses must again appear.
Engine at normal operating temperature (approx. $+80^{\circ}\text{C}$):
Starting from approx. 1200 min^{-1} (US model 900 min^{-1}), fuel-injection pulses must again appear.
If there is a malfunction:
If there is a malfunction, take out and replace the control unit.

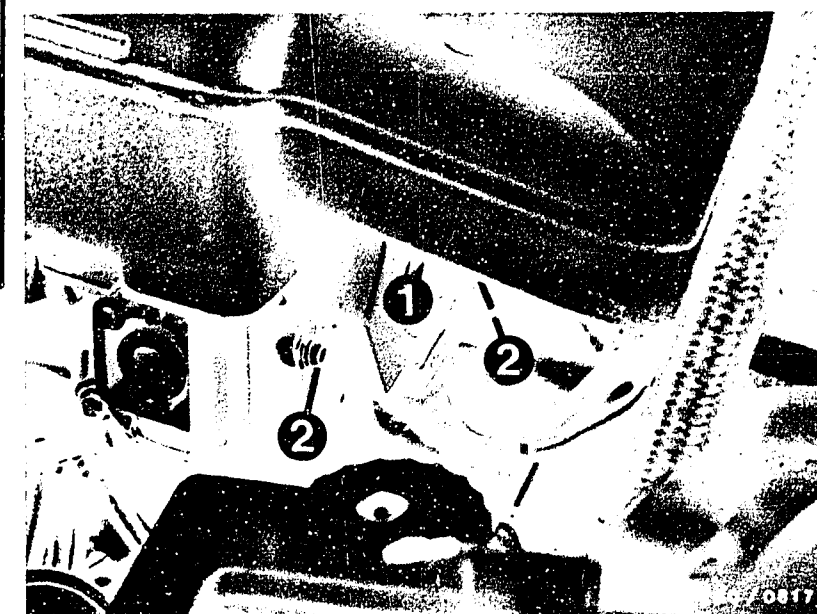
yes

Continued on J17/J18



Fuel-injection pulses of a connected output stage
(measured on the electric fuel-injection valve)
a=Pulse length (dependent on the engine load)

1=Throttle valve switch
2=Fastening screws



J15

Engine missing in all driving conditions
BMW 318i, 518i



J16

Engine missing in all driving conditions
BMW 318i, 518i



Engine missing in all driving conditions (continued)

Has the operation of the electric fuel-injection valves been checked?
Has the fuel-injection signal been examined for missing?

no

- Checking the operation of the electric fuel-injection valves

Connect the test lead as follows:

The 2-pole plug connections for the test lead are connected between an electric fuel-injection valve and its connecting lead. Only one of the other two connecting terminals of the test lead needs be connected to the special input on the motortester.

Caution!

The unused connection terminal must not come into contact with the vehicle ground!

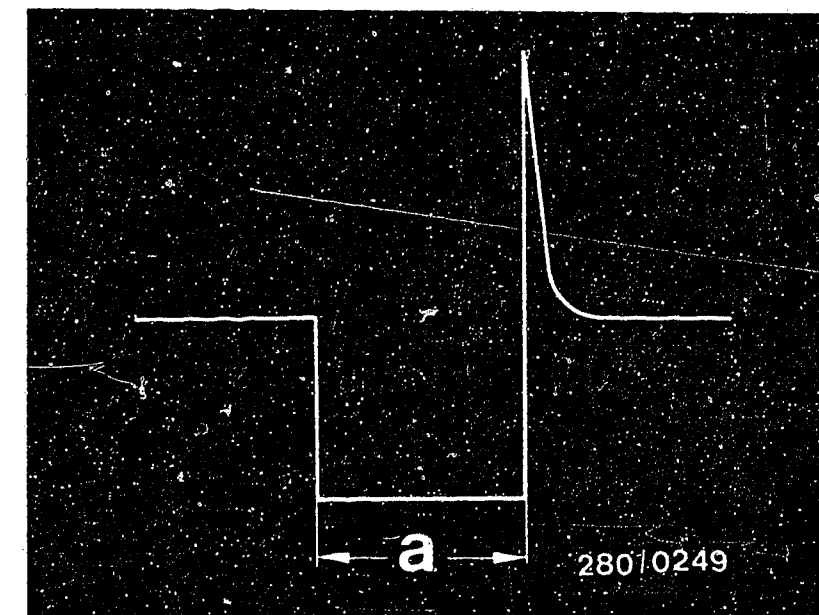
- When connected correctly, the pattern shown at the right appears on the oscilloscope. Using the test lead, it is possible to check the fuel-injection pulses on the electric fuel-injection valves while the engine is running, using an ignition oscilloscope. If the pattern at the right is not obtained, or if deviations can be seen (interference, missing, etc.), the other electric fuel-injection valves should also be examined.
- If there is interference: check how the leads have been laid.
- If there is missing: eliminate loose contacts in the leads or in the plug connections.

N.B.!

After testing, restore the original condition of installation.

yes

Continued on J19/J20



Fuel-injection pulses of a connected output stage (measured on the electric fuel-injection valve)
a=Pulse length (dependent on the engine load)

J17

Engine missing in all driving conditions
BMW 318i, 518i



J18

Engine missing in all driving conditions
BMW 318i, 518i



Engine missing in all driving conditions (continued)

yes

Are the electric fuel-injection valves O.K. mechanically and electrically?
Repair the electric fuel-injection valves.
Is the O-ring O.K.?

no

- Checking the electric fuel-injection valves mechanically and electrically
With the engine running, disconnect the electric fuel-injection valve plugs individually, one after the other, from the electric fuel-injection valves and plug them back on. If the electric fuel-injection valve is good, the engine speed must drop off. Check the connecting leads from the control relay Term. 87 to the individual electric fuel-injection valves and from the electric fuel-injection valves to the control unit plug Term. 12 for continuity using an ohmmeter.

Specified value:

approx. 0 Ω

Resistance of the individual electric fuel-injection valves

0 280 150 209/211:

15...20 Ω

0 280 150 703/704:

14.5...19.5 Ω

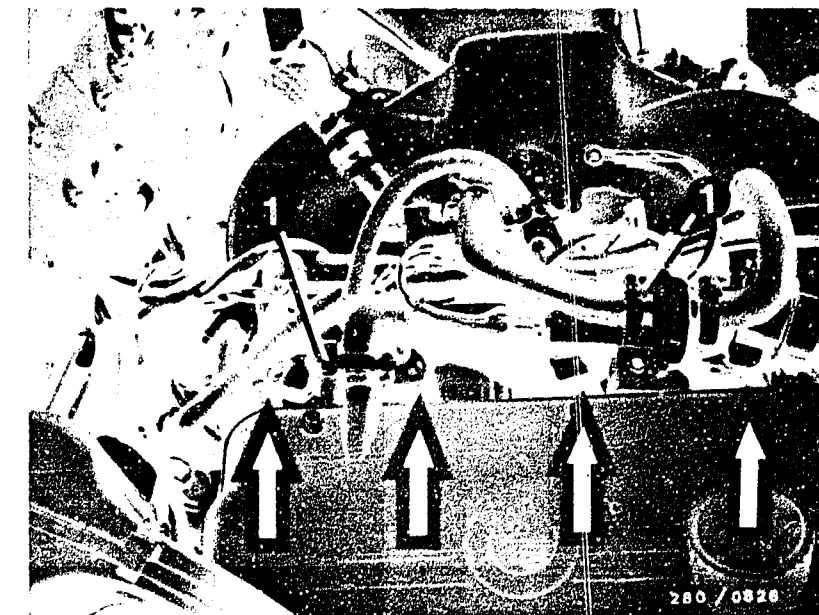
N. B.!

- Take out and replace the O-ring
When replacing electric fuel-injection valves, the electric fuel-injection valve ..209/704 must be installed (model for Europe/Sweden/Switzerland). For the US model, the same electric fuel-injection valve must be reinstalled (.. 211 or .. 703). If the electric fuel-injection valves are operating properly but the O-rings are defective, proceed as follows:
Take out the fuel distribution pipe. (Release 2 fastening screws). Disconnect the electrical connection. Carefully push the holding clamp out of the slot and pull the electric fuel-injection valve out of the fuel distribution pipe. Caution! Catch any fuel that runs out. Do not allow it to drip on hot portions of the engine. Caution! The protective sleeve must not be pried off.

yes

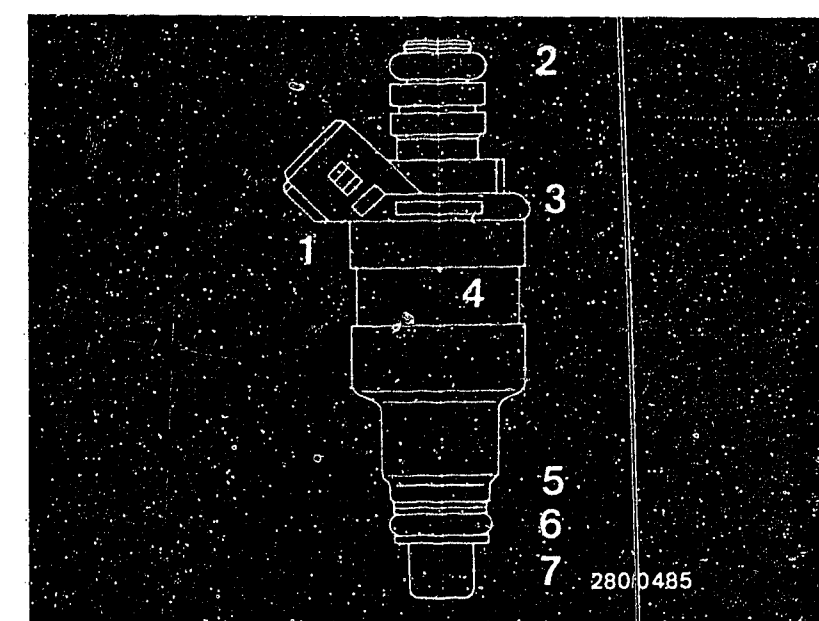
Continued on K1/K2

Continued on J21/J22



Arrows=Electric fuel-injection valves
1=Fastening screws

1=FD marking
2=upper O-ring
3=Part No.
4=Fuel-injection valve
5=Supporting plate (yellow, 2mm)
6=lower O-ring
7=Protective sleeve



J19

Engine missing in all driving conditions
BMW 318i, 518i



J20

Engine missing in all driving conditions
BMW 318i, 518i



Engine missing in all driving conditions (continued)

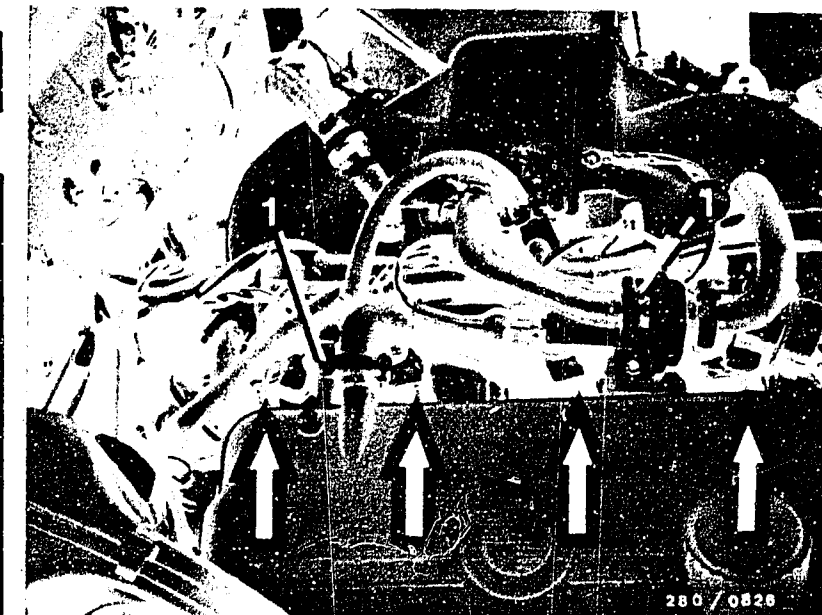
Cut apart the lower O-ring (intake manifold).
Caution! Do not damage the protective sleeve.
Pull a new O-ring on over the protective sleeve
and its shoulder. Do not damage any parts in so
doing.

- Use set of parts 1 287 010 704.
When working on the electric fuel-injection
valves, do not damage the valve needle. If the
upper O-ring (fuel distributor connection) is
swollen or damaged, it also must be taken out
and replaced.

N. B.! It is permissible to grease the 2
O-rings only lightly before installation
(silicone grease Ft 2 v 1).

The other parts of the electric fuel-injection
valve must remain free of grease.

N. B.! After finishing, restore the original
condition of installation.



Arrows=Electric fuel-injection
valves

1=Fastening screws

yes

Continued on K1/K2

J21

Engine missing in all driving conditions
BMW 318i, 518i



J22

Engine missing in all driving conditions
BMW 318i, 518i



Engine missing in all driving conditions (continued)

Is the engine free of bucking when driving off or accelerating during the warm-up phase?

no

Preconditions:

The engine, ignition, universal test adapter program, fuel pressure test, and the preceding components are O.K.

Installing a pressure switch (0 280 110 005):

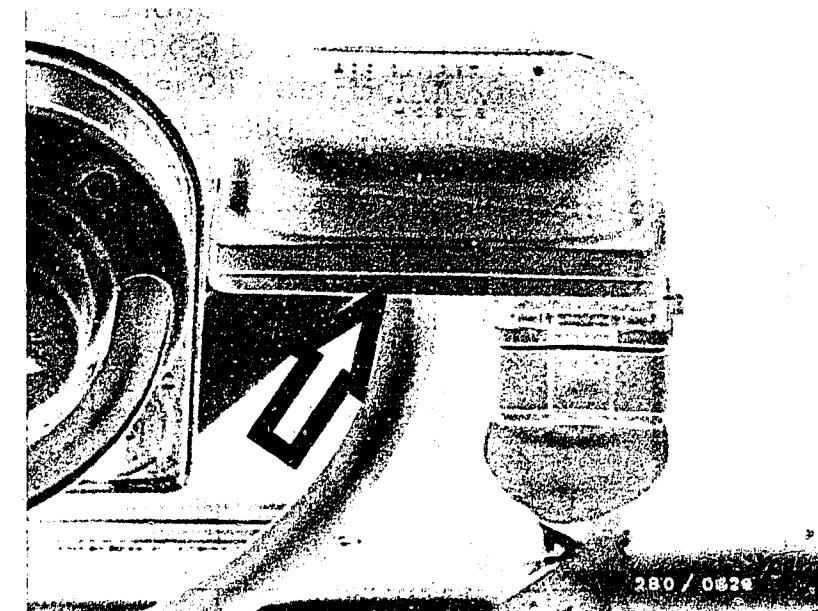
- Install the pressure switch at a location protected from splashing water.
- Make the electrical connections (see the Figure).
- Make the pneumatic connection, from the pressure switch connection to one connection on the throttle valve (intake manifold pressure).

Operation:

With certain changes in pressure in the intake manifold, the mixture is enriched somewhat for a brief time.

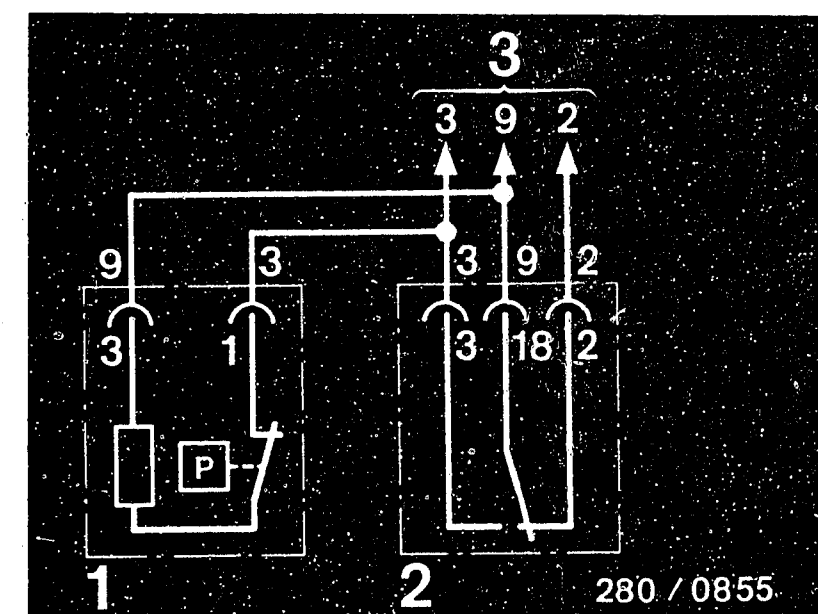
yes

Continued on K3/K4



Arrow=Pressure switch

1=Pressure switch 0 280 110 005
2=Throttle valve switch
3=to the control unit plug Term.3/9/2



K1

Engine missing in all driving conditions
BMW 318i, 518i

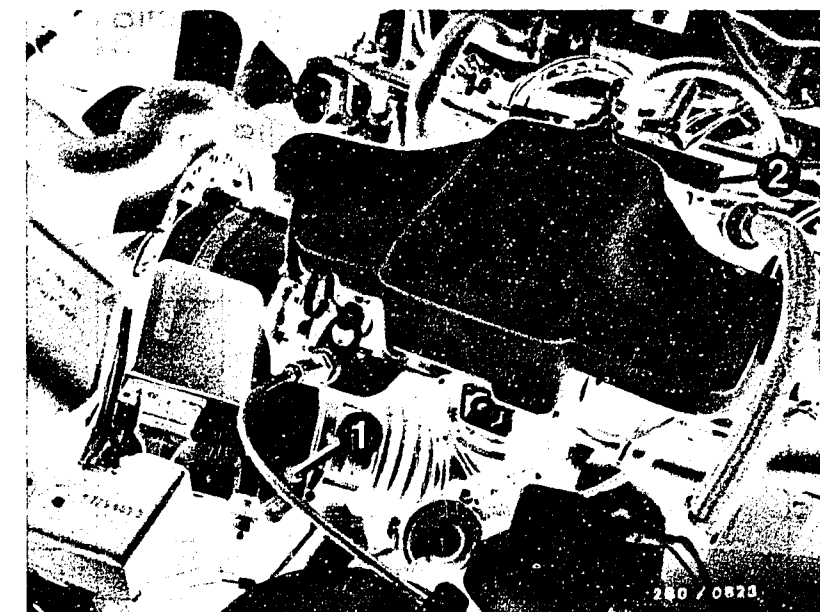


K2

Engine missing in all driving conditions
BMW 318i, 518i



Engine missing in all driving conditions (continued)



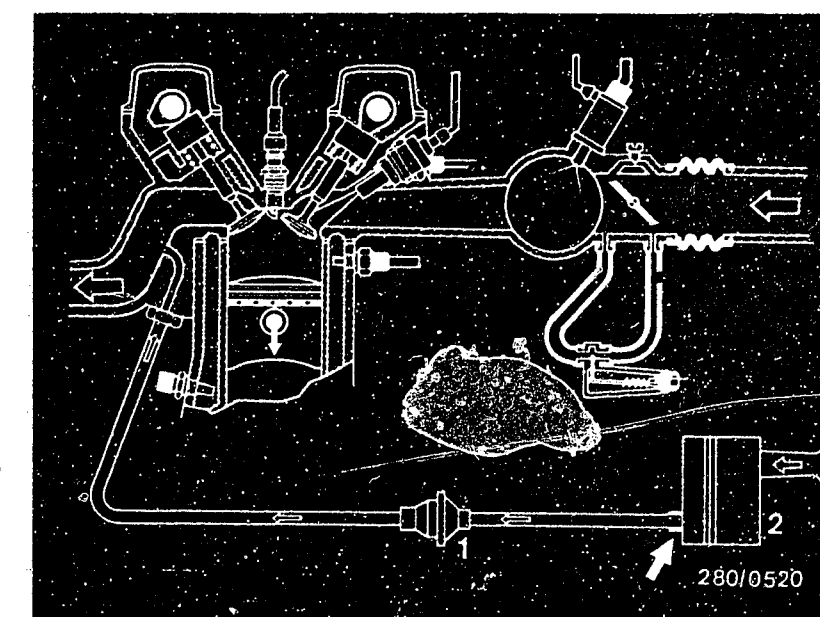
1=CO-adjusting screw
2=Idle-speed adjusting screw

Have the CO and idle speed been correctly set?
(only for the model for EU/S/
Switzerland)
Test specification:
Idle speed:
800...900 min⁻¹
CO-level
Europe: less than 1.0 vol.%CO
Sweden/Switzerland:
0.2...0.4 vol.%CO
Are these test specifications
being met?

no

- Adjustment of CO and idle speed
- Exhaust gas adjustment using the exhaust analyzer with engine at normal operating speed and at idle speed. For duration of the exhaust gas measurement and adjustment, switch the exhaust gas system off.
 - Idle speed:
Manual transmissions and automatic transmissions
(in "Park")
800...900 min⁻¹
 - CO-adjustment:
Model for Europe: less than 1.0 vol.%CO
Model for Sweden/Switzerland:
A secondary-air induction system is installed in these vehicles because of certain exhaust gas regulations.
 - Test specification:
CO-setting: 0.2...0.4 vol.%CO
(with hose on the air valves).
 - Setting if there is a defect:
CO-setting: 0.3...1.0 vol.%CO
with the air valve hose taken off and sealed.
 - When adjusting the idle speed and CO, inactivate the secondary-air induction system. To do this, disconnect the hose between the air valve and the air filter at the air filter (arrow) and seal it tightly with a plug. When operating the vehicle in countries without more stringent exhaust gas regulations, it is not necessary to inactivate the secondary-air induction system.

1=Air valve (non-return valve)
2=Air filter



Continued on K5/K6

K3

Engine missing in all driving conditions
BMW 318i, 518i



K4

Engine missing in all driving conditions
BMW 318i, 518i



Engine missing in all driving conditions (continued)

- For all vehicles:
If the CO-level is too high, adjust the bypass screw (CO-adjusting screw) in the air-flow sensor by one half turn counterclockwise (socket hex screw, AF 5). Recheck the idle speed and the CO-level once again. If need be, make corrections in several steps.
After adjustment, use a new (red) plug (1 280 508 012).

yes

Only for model for EU/S/Switzerland

Checking of the customer complaint

"Engine missing in all driving conditions"

has been completed.
Has the customer complaint been corrected?

no

Other possible defects:

- The customer complaint has been incorrectly identified. (See Coordinates C3...C8).
If the defect has not been identified using the "Targeted trouble-shooting", see "Detailed trouble-shooting". (Coordinates C3/C4).
- The engine is not O.K. mechanically (compression, valve setting, valve timing, wear on camshaft).

yes

For US model only:

- Is the idle speed control (non-Bosch product) O.K.?
- Is the lambda closed-loop control O.K.?

no

Check the idle speed control and the lambda closed-loop control (Coordinates G13...H2).

K5

Engine missing in all driving conditions
BMW 318i, 518i



K6

Engine missing in all driving conditions
BMW 318i, 518i



POOR MILEAGE

Trouble-shooting program according to customer complaint

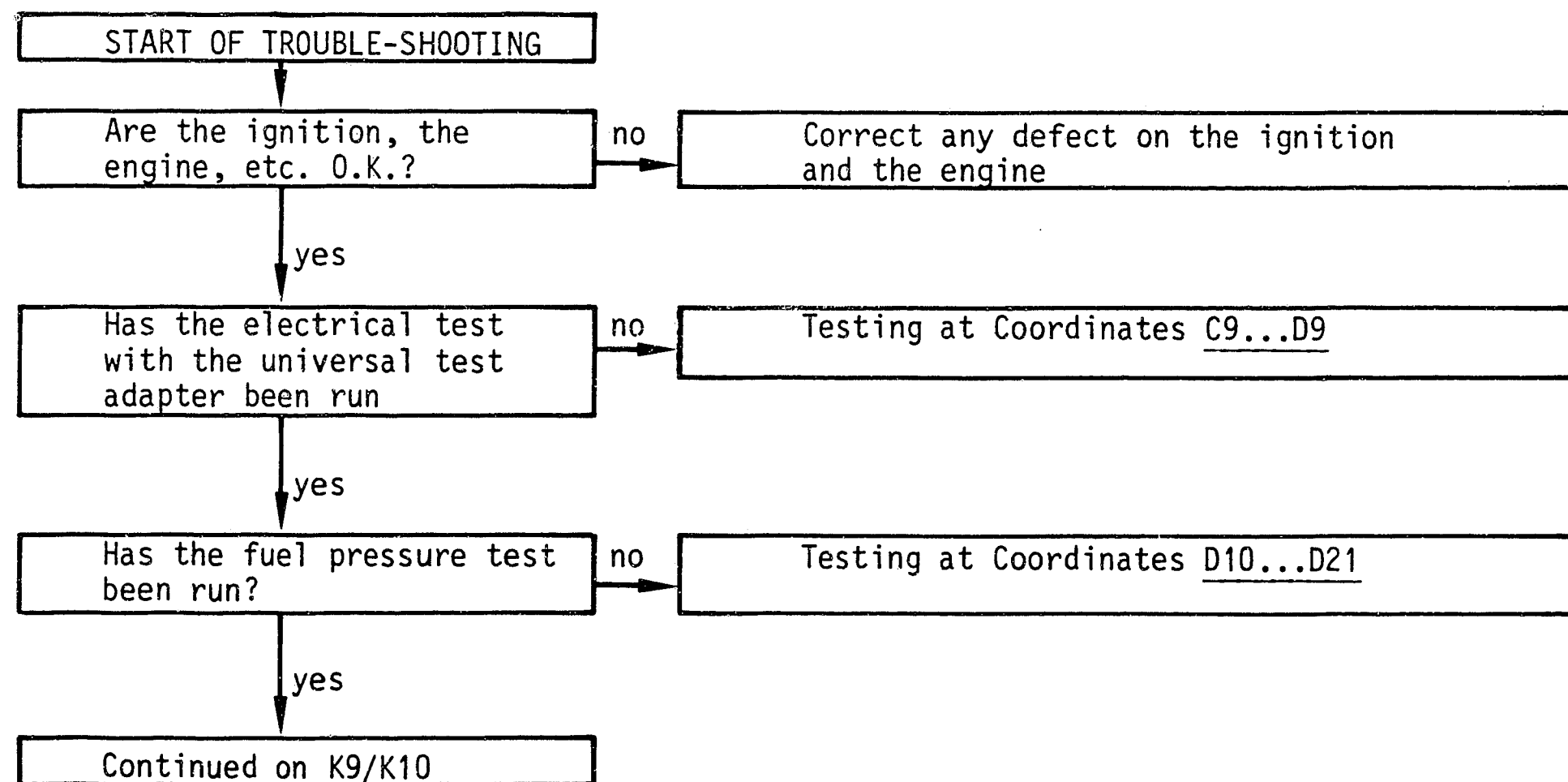
How to use the trouble-shooting program

Testing has been organized into 3 columns of boxes:

- The column at the left contains the questions for the tests being run.
- The column at the center describes the component tests and settings.
- The column at the right shows the figures belonging to the text and the legend for those figures.

If the questions can be answered clearly with "yes" even before testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no" and a defect is suspected, you must shift to the column of boxes at the center and run the tests indicated there. On completion of the testing, the trouble-shooting is continued at that point at which the shift was made.



K7

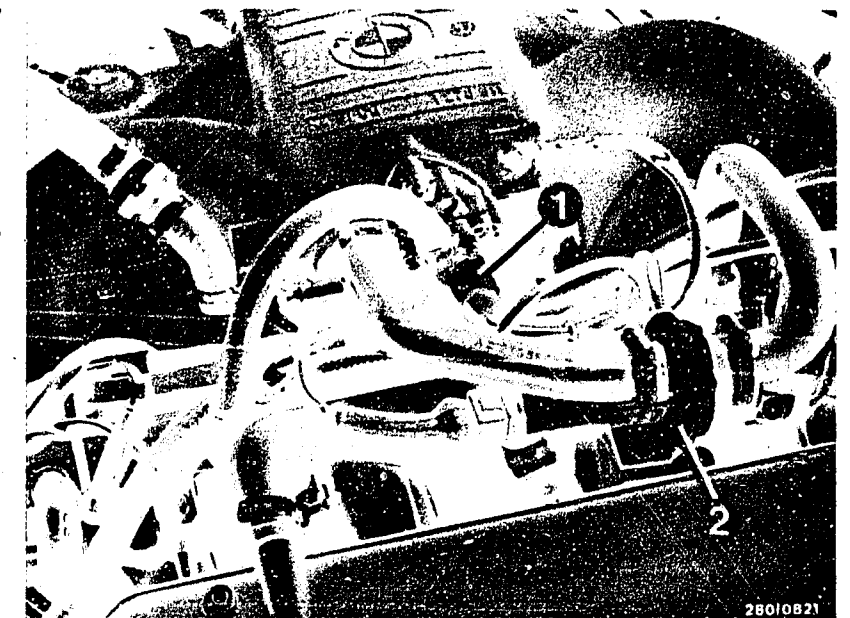
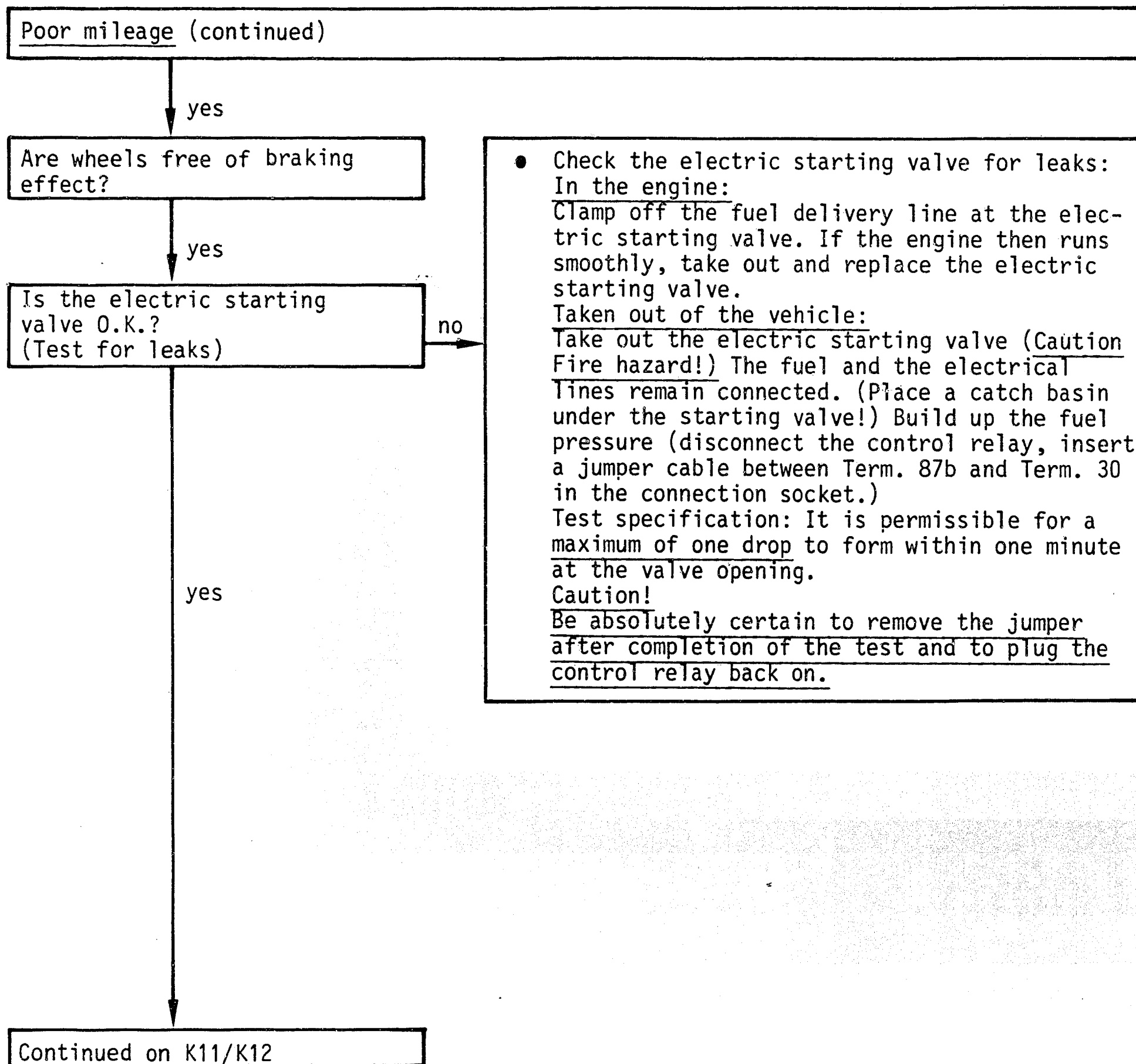
Poor mileage
BMW 318i, 518i



K8

Poor mileage
BMW 318i, 518i





1=Electric starting valve
(blue plug)

K9

Poor mileage
BMW 318i, 518i



K10

Poor mileage
BMW 318i, 518i



Poor mileage (continued)

yes

Are the electric fuel-injection valves O.K. mechanically and electrically?
Repair the electric fuel-injection valves.
Is the O-ring O.K.?

no

yes

Continued on K15/K16

- Checking the electric fuel-injection valves mechanically and electrically
With the engine running, disconnect the electric fuel-injection valve plugs individually, one after the other, from the electric fuel-injection valves and plug them back on. If the electric fuel-injection valve is good, the engine speed must drop off. Check the connecting leads from the control relay Term. 87 to the individual electric fuel-injection valves and from the electric fuel-injection valves to the control unit plug Term. 12 for continuity using an ohmmeter.

Specified value: approx. 0

Resistance of the individual electric fuel-injection valves

0 280 150 209/211: 15...20 Ω

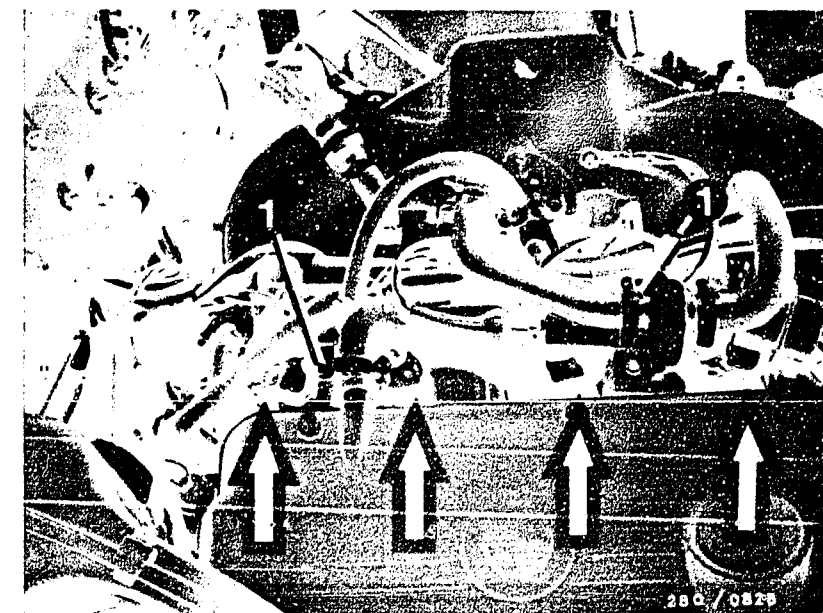
0 280 150 703/704: 14.5...19.5 Ω

- Take out and replace the O-ring

N. B.!

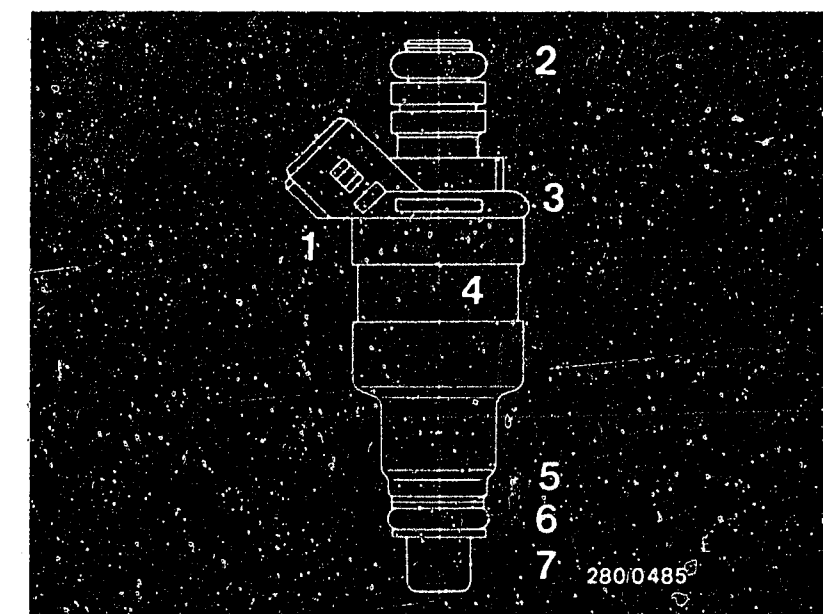
When replacing electric fuel-injection valves, the electric fuel-injection valve ... 209/704 must be installed (model for Europe/Sweden/Switzerland). For the US model, the same electric fuel-injection valve must be reinstalled (... 211 or ... 703). If the electric fuel-injection valves are operating properly but the O-rings are defective, proceed as follows: Take out the fuel distribution pipe. Release 2 fastening screws.) Disconnect the electrical connection. Carefully push the holding clamp out of the slot and pull the electric fuel-injection valve out of the distribution pipe Caution! Catch any fuel that runs out. Do not allow it to drip on hot portions of the engine. Caution! The protective sleeve must not be pried off.

Continued on K13/K14



Arrows=Electric fuel-injection valves
1=Fastening screws for fuel distribution pipe

1=FD marking
2=upper O-ring
3=Part No.
4=Fuel-injection valve
5=Supporting plate (yellow, 2mm)
6=lower O-ring
7=Protective sleeve



K11

Poor mileage
BMW 318i, 518i



K12

Poor mileage
BMW 318i, 518i



Poor mileage (continued)

Cut apart the lower O-ring (intake manifold).
Caution! Do not damage the protective sleeve.
Pull a new O-ring on over the protective sleeve
and its shoulder. Do not damage any parts in so
doing.
Use set of parts 1 287 010 704.
When working on the electric fuel-injection
valves, do not damage the valve needle. If the
upper O-ring (fuel distribution pipe connection) is
swollen or damaged, it also must be taken out
and replaced.

N. B.! It is permissible to grease the 2
O-rings only lightly before installation (silicone
grease Ft 2 v 1).

The other parts of the electric fuel-injection
valve must remain free of grease.

N. B.! After testing, restore the original
condition of installation

yes

Continued on K15/K16



Arrows=Electric fuel-injection
valves
1=Fastening screws

K13

Poor mileage
BMW 318i, 518i



K14

Poor mileage
BMW 318i, 518i



Poor mileage (continued)

yes

Is the air-flow sensor mechanically and electrically O.K.?

Is the resistance within tolerance?

Between Term. 8 and Term. 9:
160...300 Ω

Between Term. 7 and Term. 5
(deflect air-flow sensor flap):
60...1000 Ω

no

Testing:

Release the clamps on the air filter.
Lift off the upper portion of the air filter.

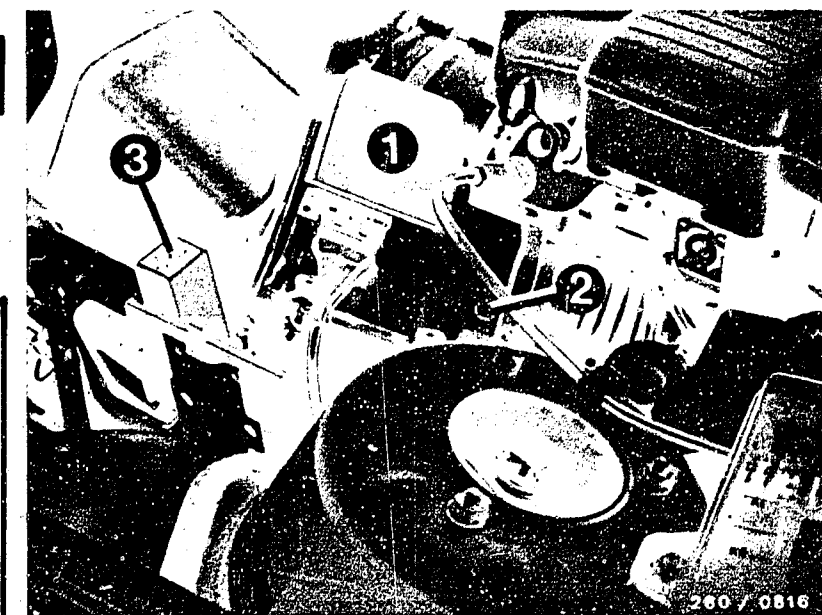
- Check the air-sensor flap for easy movement.
Open the air-flow sensor flap manually. It must be uniformly easy to open the air-flow sensor flap as far as the stop, and the flap must then close again as far as the stop by itself. The air-flow sensor flap must not stick when opening.
- Check the air-flow sensor mechanically.
Watch for signs of grinding. If the air-flow sensor is very dirty inside, clean it and rub it out with a lint-free cloth. If there are signs of grinding, the air-flow sensor must be taken out and replaced.
The air-flow sensor flap must return to the at-rest position. If not, the stopper or the air-flow sensor flap is bent out of shape. The air-flow sensor must be taken out and replaced.
- Check resistances
Connect an ohmmeter to Term. 8 and Term. 9 on the air-flow sensor.
Test specification: 160...300 Ω
Connect an ohmmeter to Term. 7 and Term. 5 of the air-flow sensor.
Deflect the air-flow sensor flap.
Test specification: 60...1000 Ω

N. B.!

On completion of the test, the air filter and the air-flow sensor must be put back together.

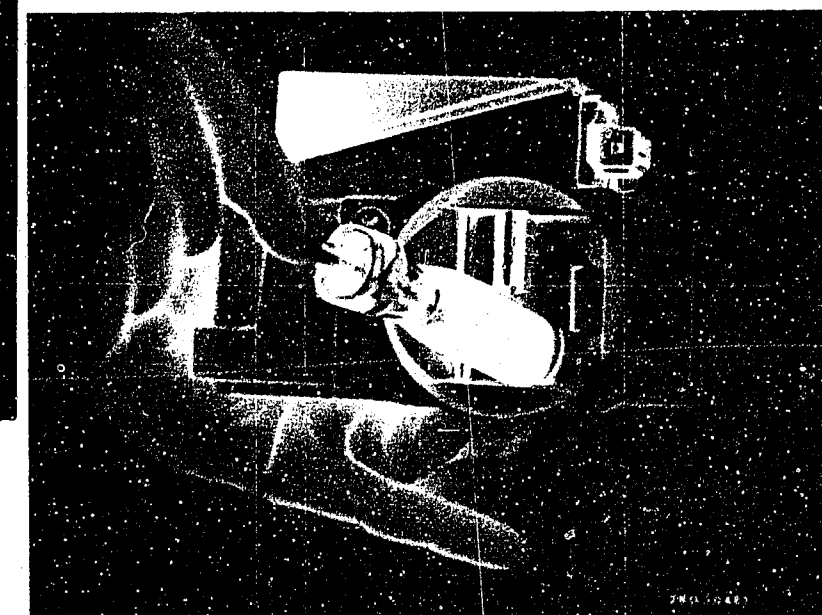
yes

Continued on K17/K18



1=Air-flow sensor
2=CO-adjusting screw

Pressing on the sensor flap in the air-flow sensor



K15

Poor mileage

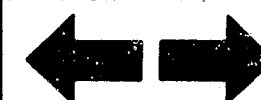
BMW 318i, 518i



K16

Poor mileage

BMW 318i, 518i



Poor mileage (continued)

yes

Have the CO and idle speed been correctly set?
(only for the model for EU/S/ Switzerland)

Test specification:

Idle speed:
800...900 min⁻¹

CO-level

Europe: less than 1.0 vol.%CO

Sweden/Switzerland:
0.2...0.4 vol.%CO

Are these test specifications being met?

no

Adjustment of CO and idle speed

- Exhaust gas adjustment using the exhaust analyzer with engine at normal operating speed and at idle speed. For duration of the exhaust gas measurement and adjustment, switch the exhaust gas system off.

• Idle speed:

Manual transmissions and automatic transmissions

(in "Park")

800...900 min⁻¹

• CO-adjustment:

Model for Europe: less than 1.0 vol.%CO

Model for Sweden/Switzerland:

A secondary-air induction system is installed in these vehicles because of certain exhaust gas regulations.

- Test specification:

CO-setting: 0.2...0.4 vol.%CO
(with hose on the air valves).

- Setting if there is a defect:

CO-setting: 0.3...1.0 vol.%CO

with the air valve hose taken off and sealed.

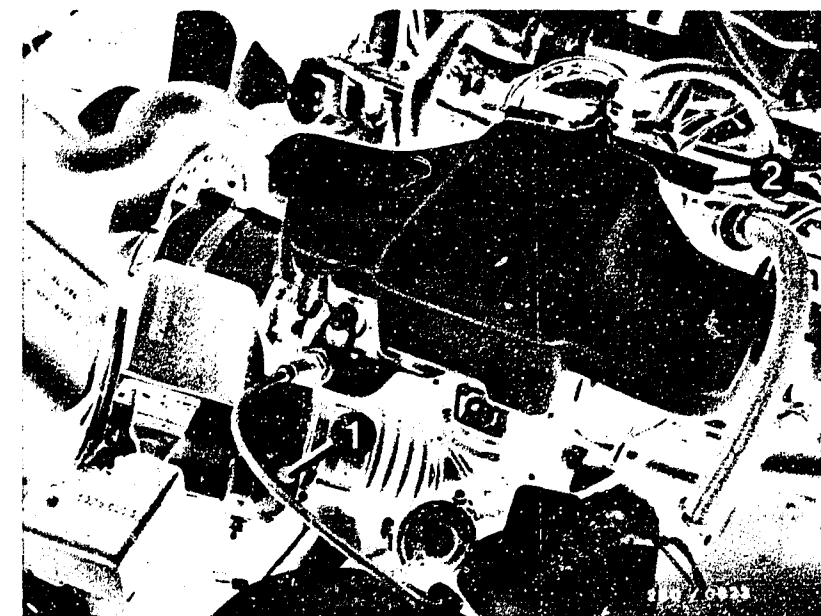
- When adjusting the idle speed and CO, inactivate the secondary-air induction system. To do this, disconnect the hose between the air valve and the air filter at the air filter (arrow) and seal it tightly with a plug. When operating the vehicle in countries without more stringent exhaust gas regulations, it is not necessary to inactivate the secondary-air induction system.

yes

Idle speed cannot be adjusted.

yes

Continued on K19/K20

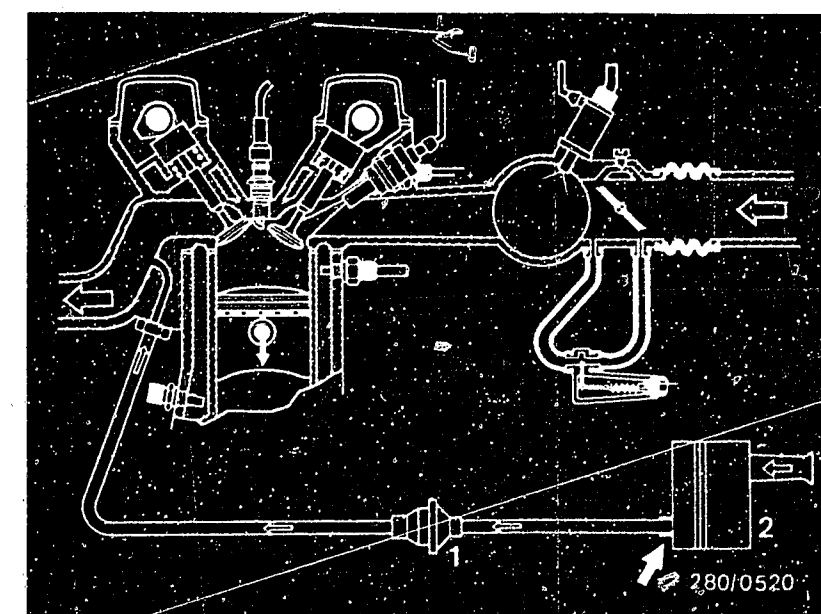


1=CO-adjusting screw

2=Idle-speed adjusting screw

1=Air valve (non-return valve)

2=Air filter



K17

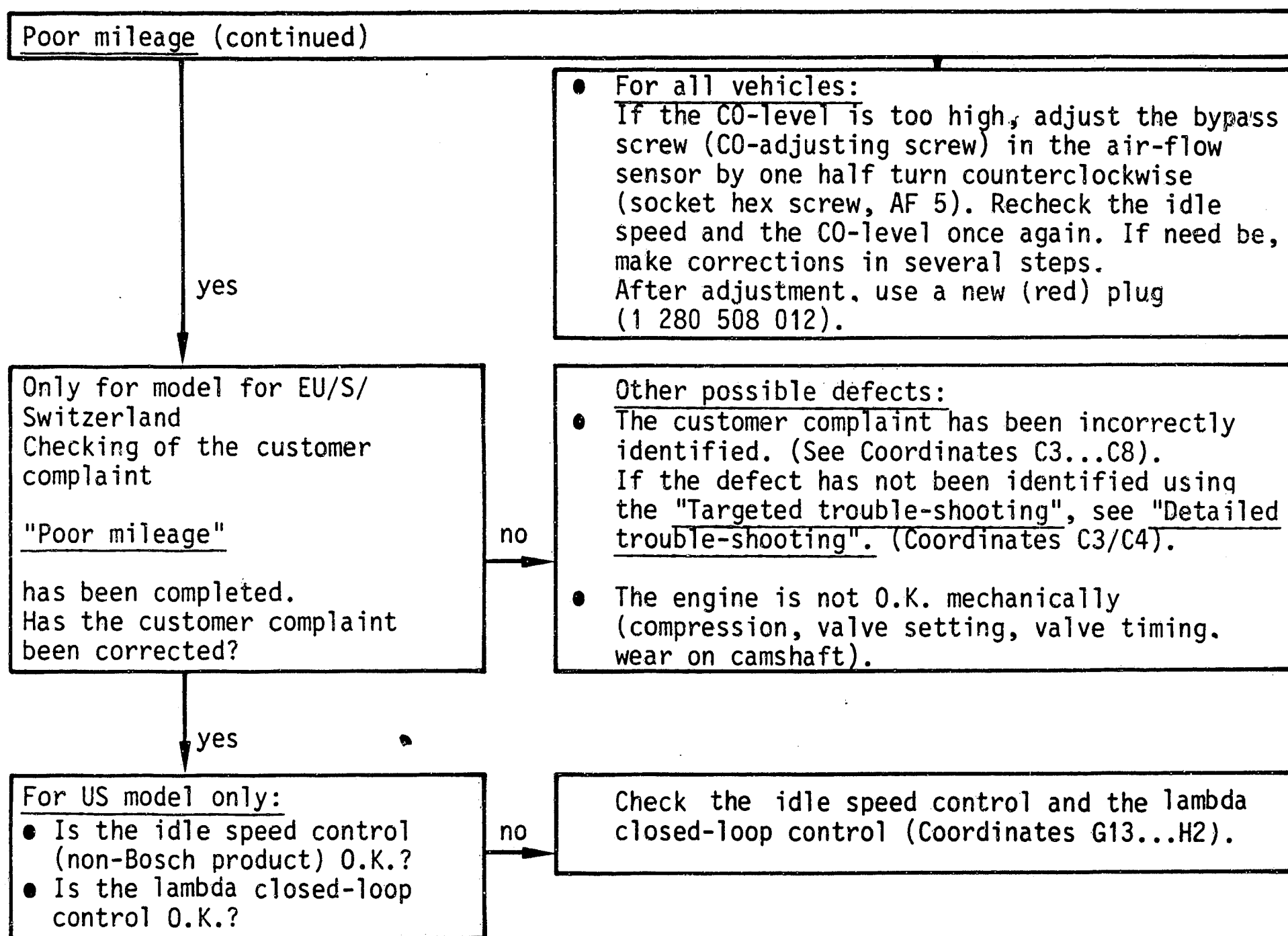
Poor mileage
BMW 318i, 518i



K18

Poor mileage
BMW 318i, 518i





NO MAX. ENGINE POWER, MAX. SPEED IS NOT ATTAINED

Trouble-shooting program according to customer complaint

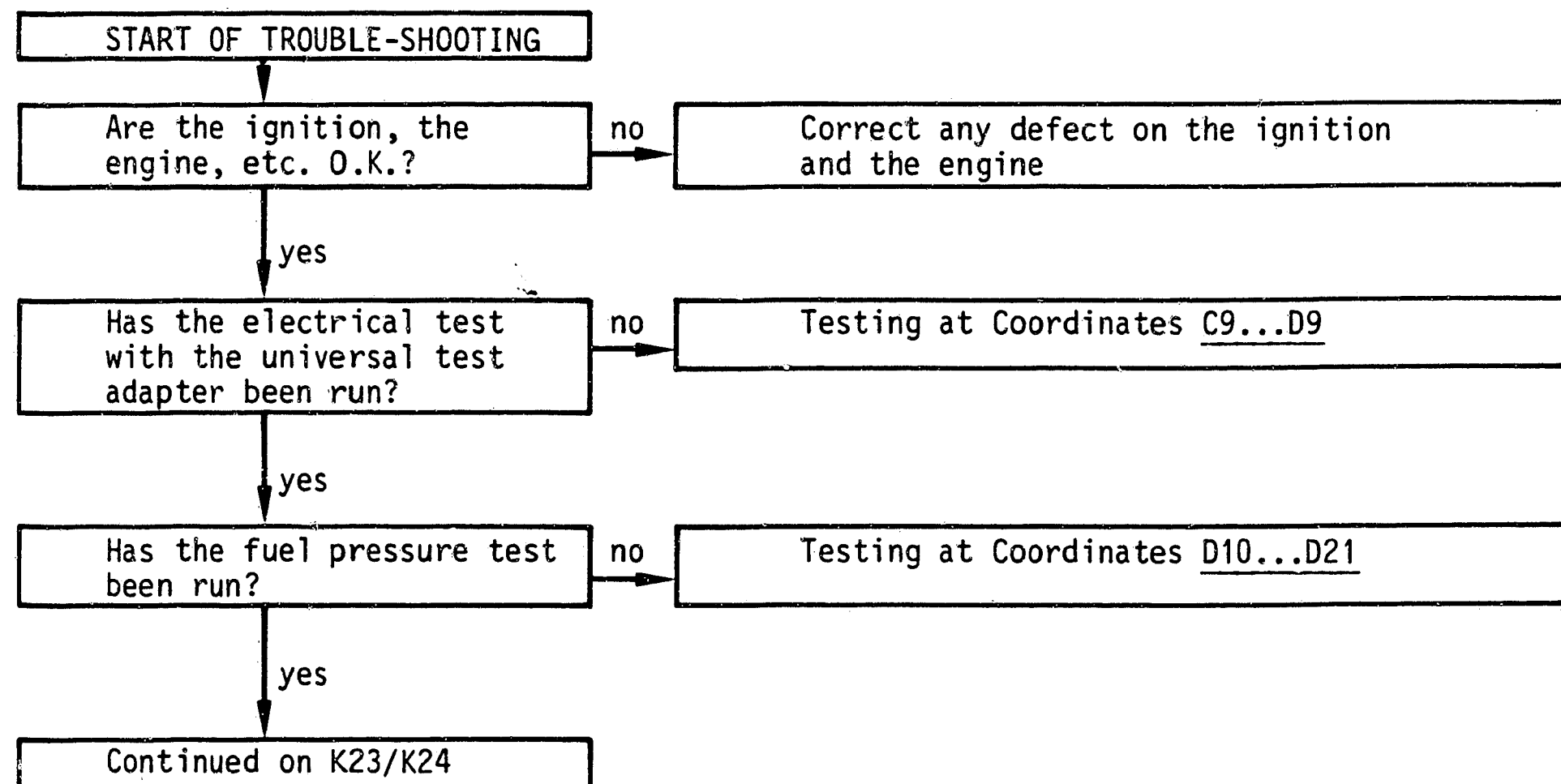
How to use the trouble-shooting program

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If the questions can be answered clearly with "yes" even before testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no" and a defect is suspected, you must shift to the column of boxes at the center and run the tests indicated there. On completion of the testing, the trouble-shooting is continued at that point at which the shift was made.



K21

No max. engine power
BMW 318i, 518i



K22

No max. engine power
BMW 318i, 518i



No max. engine power, max. speed is not attained (continued)

yes

Does the throttle valve open all the way?

no

Are the accelerator linkage, the accelerator pedal O.K.? If need be, straighten the linkage. The accelerator linkage can stick due to the floor covering, etc.. Inspect the plug connection on the throttle valve switch. Using an ohmmeter, check the lead from Term. 3 of the multiple plug to the throttle valve switch Term. 3 and from the throttle valve switch lead 9 (Term. 18) to the multiple plug Term. 9 for continuity. (In so doing, open the throttle valve completely.) Specified value approx. 0 Ω . If need be, take out and replace the throttle valve switch.

yes

US model only:

Is the exhaust catalytic convertor clogged?

- Comparative measurement of CO
- Replacement interval for sensors

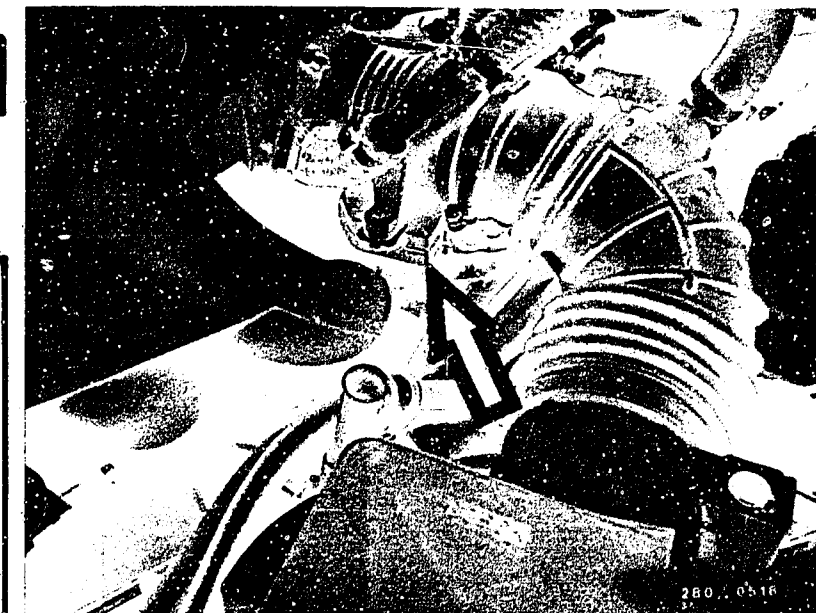
no

Comparative measurement of CO

- Release the sensor connection (open-loop control) and with the engine at normal operating temperature, measure the CO level after the catalytic convertor (exhaust end). Note down the value found.
- Unscrew the sensor and with the engine at normal operating temperature, measure the CO-level in the sensor hole before the catalytic convertor. (Leaks). Note down the value found.
- If the two values are approximately equal, the catalytic convertor is clogged and must be taken out and replaced. If the catalytic convertor is good, a CO-level less than 0.2 vol. %CO is measured at the exhaust end. Watch the interval for replacement of the lambda sensor: approx. 50 000 km (30 000 miles).

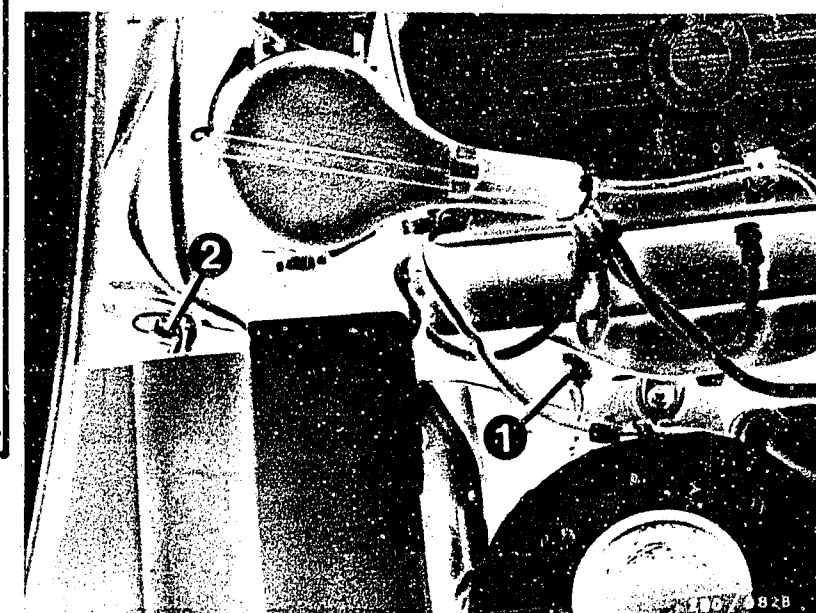
yes

Continued on L1/L2



Arrow=Throttle valve switch

1=Lambda sensor
2=Sensor connection



K23

No max. engine power
BMW 318i, 518i



K24

No max. engine power
BMW 318i, 518i



No max. engine power, max. speed is not attained (continued)

yes

Is the control unit O.K.?
(Full-load enrichment)

no

- Connect the test lead as follows:
The 2-pole plug connections for the test lead are connected between an electric fuel-injection valve and its connecting lead. Only one of the other two connecting terminals of the test lead needs be connected to the special input on the motortester.

Caution!

The unused connection terminal must not come into contact with the vehicle ground!

- When connected correctly, the pattern shown at the right appears on the oscilloscope. Using the test lead, it is possible to check the fuel-injection pulses on the electric fuel-injection valves while the engine is running, using an ignition oscilloscope.

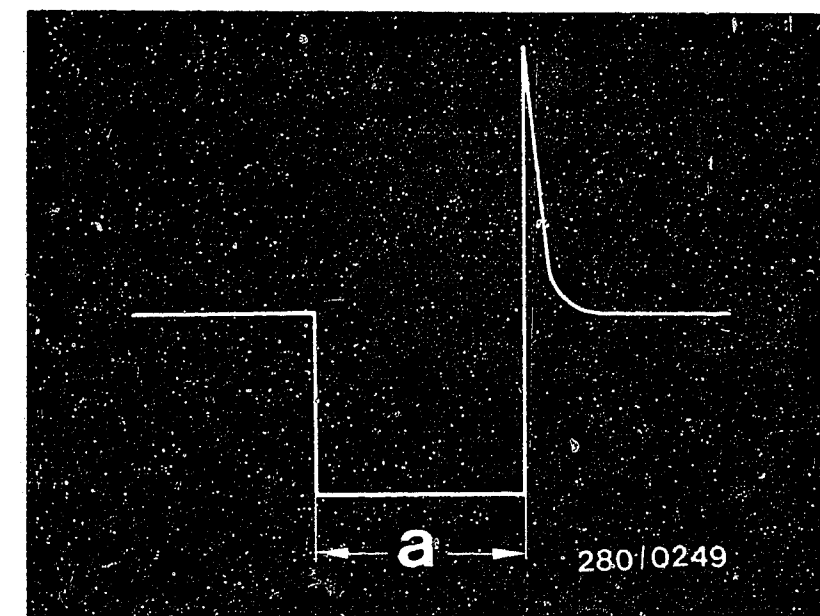
- Checking the full-load boost
Watch the fuel-injection pulses at idle. Disconnect the throttle valve switch connecting plug and jump Term. 3 and Term. 18 (lead 9) (insulated jumper wire).

N. B.!

Do not bend any plug prongs. The fuel-injection pulse must become longer. If not: check the connecting leads from the multiple plug to the throttle valve switch Term. 3 and Term. 18 (lead 9) for continuity. If O.K., take out and replace the control unit.

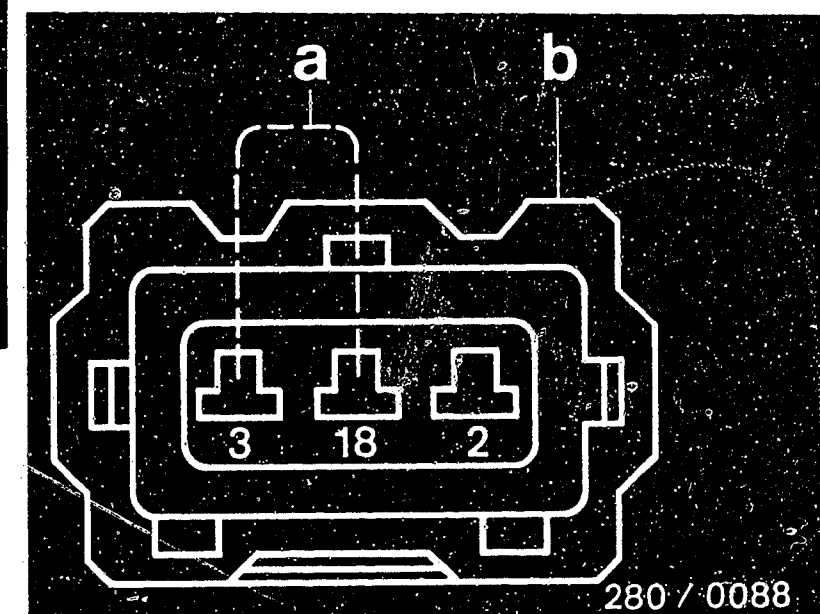
yes

Continued on L3/L4



Fuel-injection pulses of a connected output stage (measured on the electric fuel-injection valve)
a=Pulse length (dependent on the engine load)

a=Wire loop (insulated)
b=Throttle valve switch
(-Connection plug)



L1

No max. engine power
BMW 318i, 518i



L2

No max. engine power
BMW 318i, 518i



No max. engine power, max. speed is not attained (continued)

yes

Is the fuel delivery from the electric fuel pump O.K.?
Test specification: min. 650 cm³/30 sec.
Is this test specification being met?

no

- Measure the fuel delivery:
 - For testing, release the connection between the fuel return hose (from the pressure regulator) and the fuel return line (to the fuel tank).
 - Extend the hose if necessary, and direct it into a 5 l container with a measuring scale.
 - Disconnect the control relay. Put a jumper cable in between Term. 87b and Term. 30 on the connection socket. The electric fuel pump must run.
- Test specification: min. 650 cm³/30 sec.

Caution!

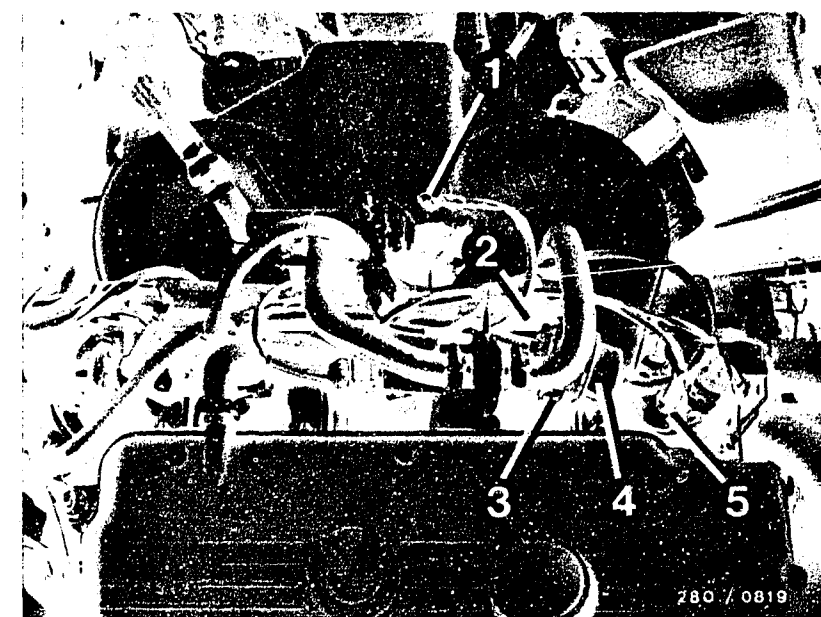
Be absolutely certain to remove the jumper cable after completion of the test.

Corrective action if the test specification is not met:

- Fuel filter is clogged → take it out and replace it.
- Voltage at the fuel pump plugs must be min. 12 V when the engine is running. If not, clean the contacts, eliminate any poor ground connection. Take out and replace the leads.
- If the pressure regulator is defective, take it out and replace it. The pressure regulator is fastened to the distribution pipe with two fastening screws via an O-ring. After the pressure regulator has been taken out, the O-ring and the flat ring must be taken out and replaced. (Use set of parts 1 287 010 704).
- If the fuel pump output is too low, take out and replace the electric fuel pump. (On the left under the vehicle, near the rear axle.)

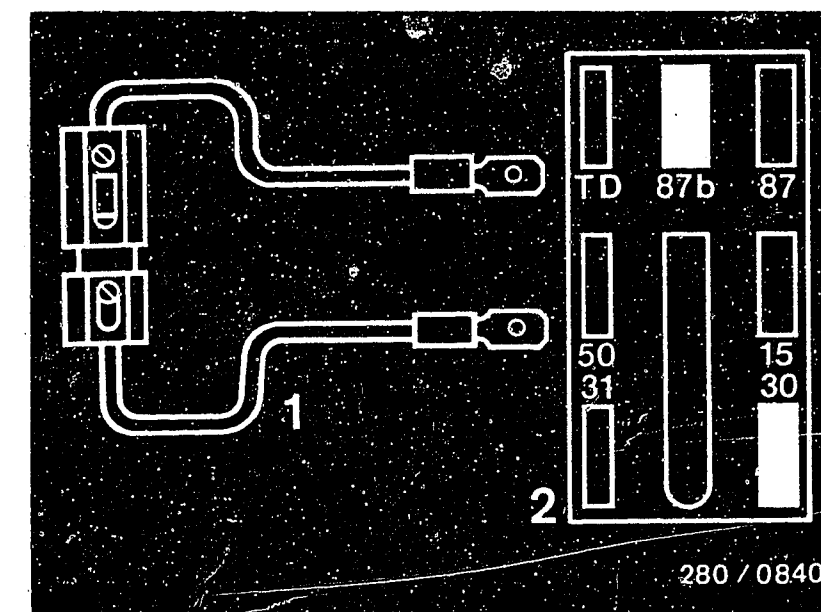
yes

Continued on L5/L6



2=Fuel return line
3=Fastening screws
4=Pressure regulator

Jumper cable (user-fabricated)
1=Fuse holder with 10 A fuse
2=Top view of connection socket
(US model similar)



L3

No max. engine power
BMW 318i, 518i



L4

No max. engine power
BMW 318i, 518i



No max. engine power, max. speed is not attained (continued)

yes

Is the air-flow sensor mechanically and electrically O.K.?

Is the resistance within tolerance?

Between Term. 8 and Term. 9:
 $160 \dots 300 \Omega$

Between Term. 7 and Term. 5
(deflect air-flow sensor flap):
 $60 \dots 1000 \Omega$

no

Testing:

Release the clamps on the air filter.

Lift off the upper portion of the air filter.

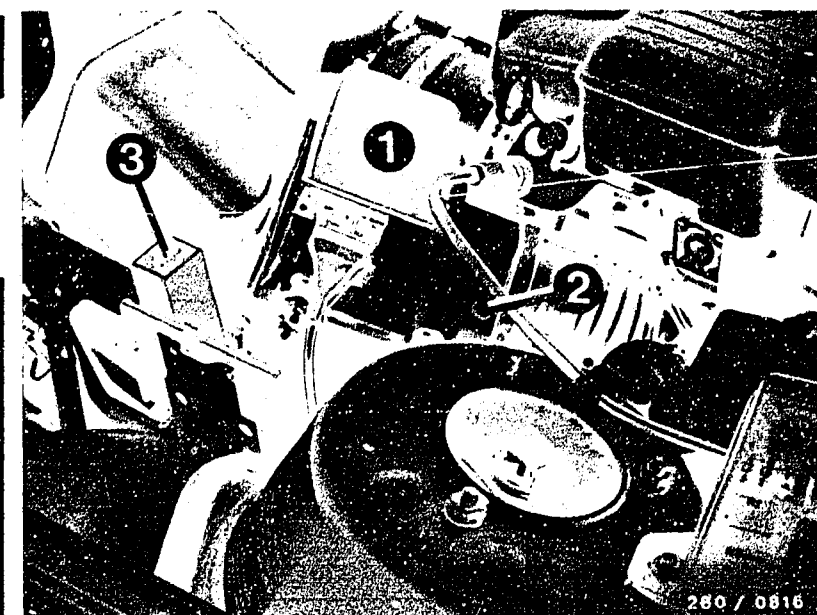
- Check the air-sensor flap for easy movement
Open the air-flow sensor flap manually. It must be uniformly easy to open the air-flow sensor flap as far as the stop, and the flap must then close again as far as the stop by itself. The air-flow sensor flap must not stick when opening.
- Check the air-flow sensor mechanically
Watch for signs of grinding. If the air-flow sensor is very dirty inside, clean it and rub it out with a lint-free cloth. If there are signs of grinding, the air-flow sensor must be taken out and replaced.
The air-flow sensor flap must return to the at-rest position. If not, the stopper or the air-flow sensor flap is bent out of shape. The air-flow sensor must be taken out and replaced.
- Check resistances
Connect an ohmmeter to Term. 8 and Term. 9 on the air-flow sensor.
Test specification: $160 \dots 300 \Omega$
Connect an ohmmeter to Term. 7 and Term. 5 of the air-flow sensor.
Deflect the air-flow sensor flap.
Test specification: $60 \dots 1000 \Omega$

N. B.!

On completion of the test, the air filter and the air-flow sensor must be put back together.

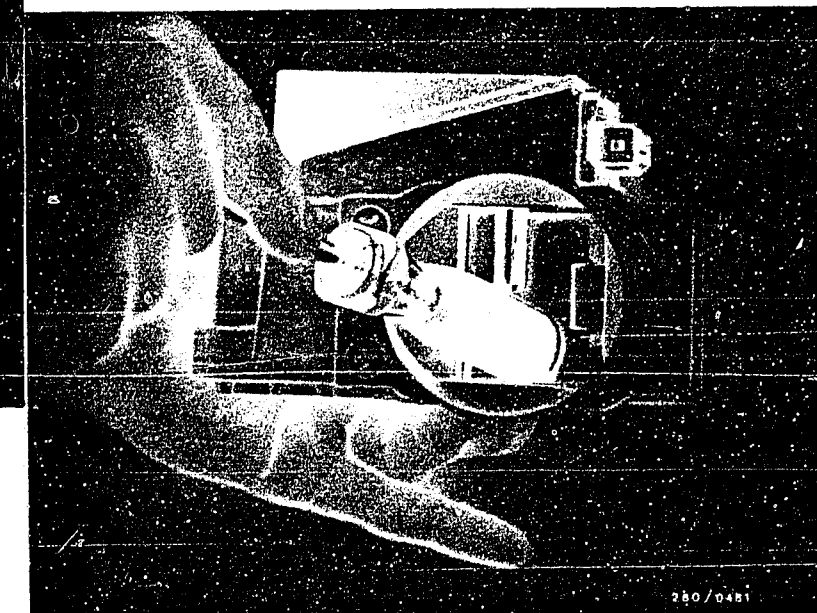
yes

Continued on L7/L8



1=Air-flow sensor
2=CO-adjusting screw

Pressing on the sensor flap in the air-flow sensor



L5

No max. engine power
BMW 318i, 518i



L6

No max. engine power
BMW 318i, 518i



No max. engine power, max. speed is not attained (continued)

yes

Are all hose lines and electrical lead connections put on correctly, without sharp bending or damage?
Visual inspection.
Has the air intake system been checked for leaks at 0.3 bar gauge pressure?

no

- Check that the hoses of the air-intake system and the fuel line system are put on correctly, without sharp bending or damage. If need be, take out and replace the hoses. Eliminate leaks using new seals or by tightening the connection screws.

• Testing for leaks:

Seal off the exhaust pipe. Release the clamps at the air filter. Lift off the top part of the air filter and seal the air-flow sensor channel. Disconnect the hose after the auxiliary-air device and, using a compressed air gun, blow air (0.3 bar gauge pressure) into the intake manifold. Seal off the auxiliary-air device connection. In so doing, open the throttle valve completely. Using soapy water, spray or brush on all seal locations. Leaks can also occur at the following points on the engine: The oil dipstick has not been inserted firmly, the cover seal for the oil filling pipe is defective, etc. Bubbling or foaming indicates leaks.

yes

Continued on L9/L10



Model for Europe

- 1=Electric starting valve
- 2=Auxiliary-air device
- 3=NTC II
- 4=Thermotime switch
- 5=Pressure regulator
- 6=Air-flow sensor
- 7=Fuel-line-pressure damper
- 8=Control relay
- 9=Ground terminals
- 10=Electric fuel-injection valves
- 12=Throttle valve switch

L7

No max. engine power
BMW 318i, 518i



L8

No max. engine power
BMW 318i, 518i



No max. engine power, max. speed is not attained (continued)

yes

Checking of the customer complaint:

"No max. engine power, max. speed is not being attained,"

has been completed.
Has the customer complaint been corrected?

no

Model for Sweden/Switzerland:

The secondary-air induction system has been installed here as an additional measure to reduce the toxic substances in the exhaust gas.

- Testing for leaks:

In addition, the lines for the secondary-air induction system and the air valves must be checked.

Model for the US:

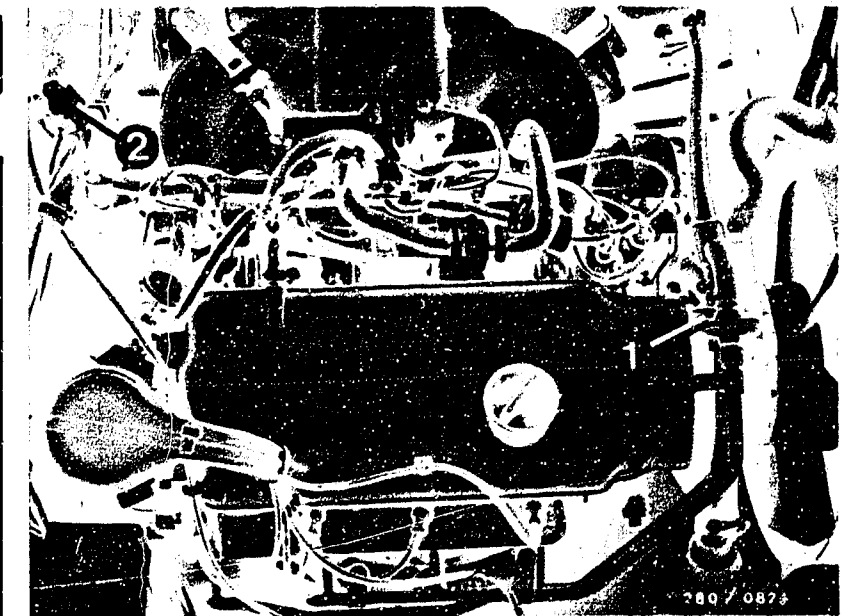
Because of the strict exhaust gas regulations in the USA, a lambda closed-loop control with a 3-bed catalytic convertor must be installed in these engines. In addition, the USA model has an idle actuator instead of the auxiliary-air device, i.e., an idle speed control built by VDO.

- Testing for leaks:

In addition, the hoses for the idle speed control system must be checked.

Other possible defects:

- The customer complaint has been incorrectly identified. (See Coordinates C3...C8). If the defect has not been identified using the "Targeted trouble-shooting", see "Detailed trouble-shooting". (Coordinates C3/C4).
- The engine is not O.K. mechanically (compression, valve setting, valve timing, wear on camshaft).

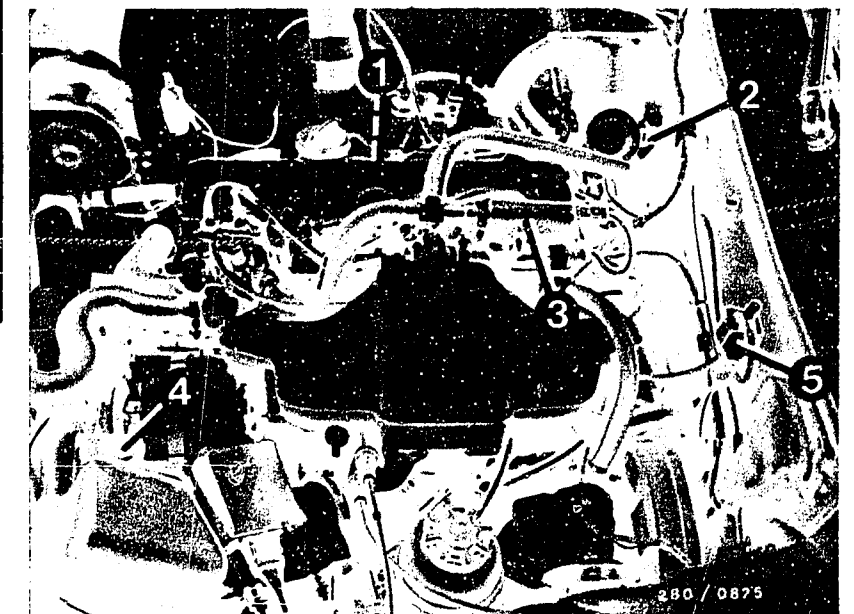


Model for Sweden/Switzerland

1=natural aspiration air valves
2=Solenoid-operated valve

Model for US

1=Lambda sensor
2=Sensor connection
3=Idle actuator (VDO)
4=Pressure sensor (altitude sensor)
5=Solenoid-operated valve



L9

No max. engine power
BMW 318i, 518i



L10

No max. engine power
BMW 318i, 518i



IDLE SPEED AND CO-LEVEL TOO LOW OR TOO HIGH

Trouble-shooting program according to customer complaint

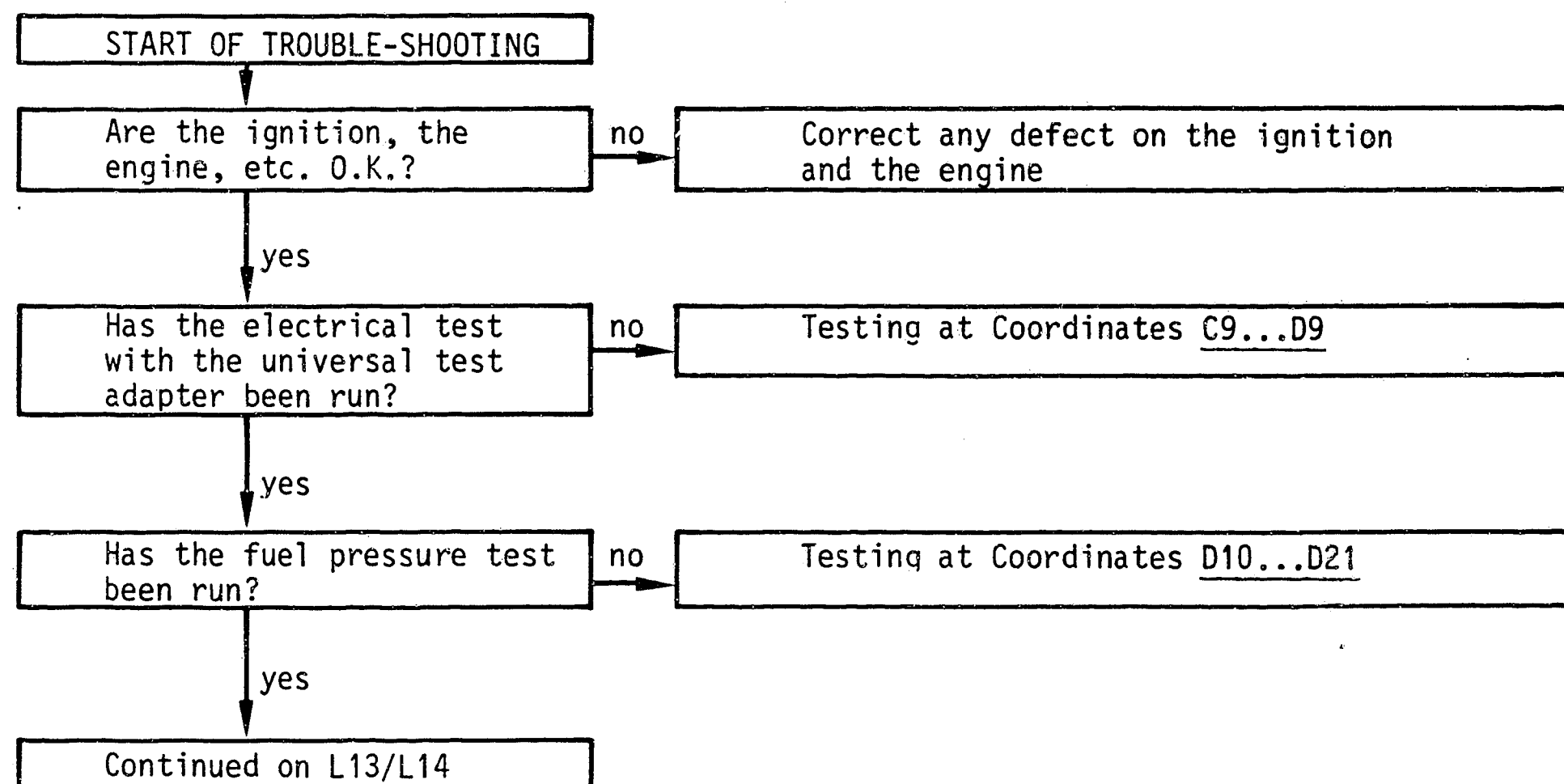
How to use the trouble-shooting program

Testing has been organized into 3 columns of boxes:

- The column at the left contains the questions for the tests being run.
- The column at the center describes the component tests and settings.
- The column at the right shows the figures belonging to the text and the legend for those figures.

If the questions can be answered clearly with "yes" even before testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no" and a defect is suspected, you must shift to the column of boxes at the center and run the tests indicated there. On completion of the testing, the trouble-shooting is continued at that point at which the shift was made.



L11

Idle and CO-adjustment

BMW 318i, 518i



L12

Idle and CO-adjustment

BMW 318i, 518i



Idle and CO-adjustment (continued)

yes

Have the CO and idle speed been correctly set?
(only for the model for EU/S/
Switzerland)

Test specification:

Idle speed:
800...900 min⁻¹

CO-level

Europe:

Less than 1.0 vol.%CO

Sweden/Switzerland:

0.2...0.4 vol.%CO

Are these test specifications being met?

yes

Idle speed cannot be adjusted.

yes

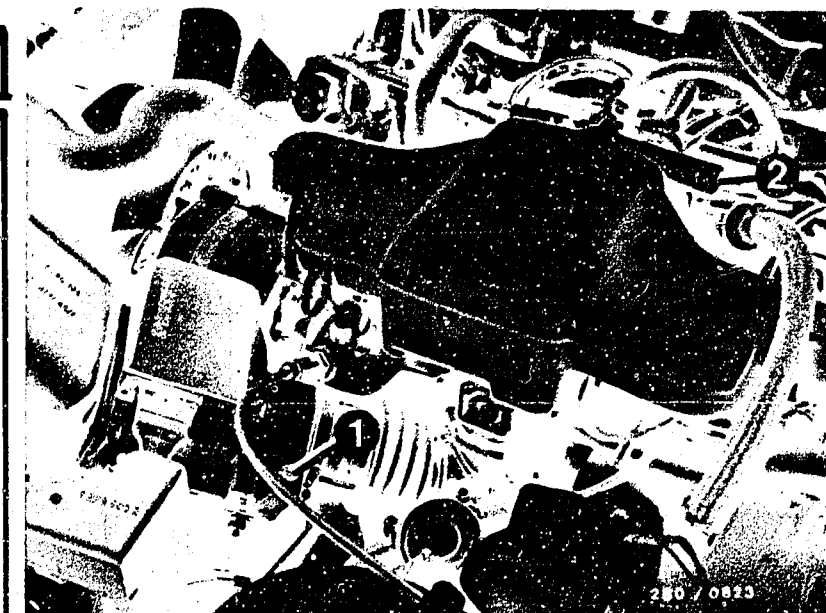
Continued on L17/L18

no

Adjustment of CO and idle speed

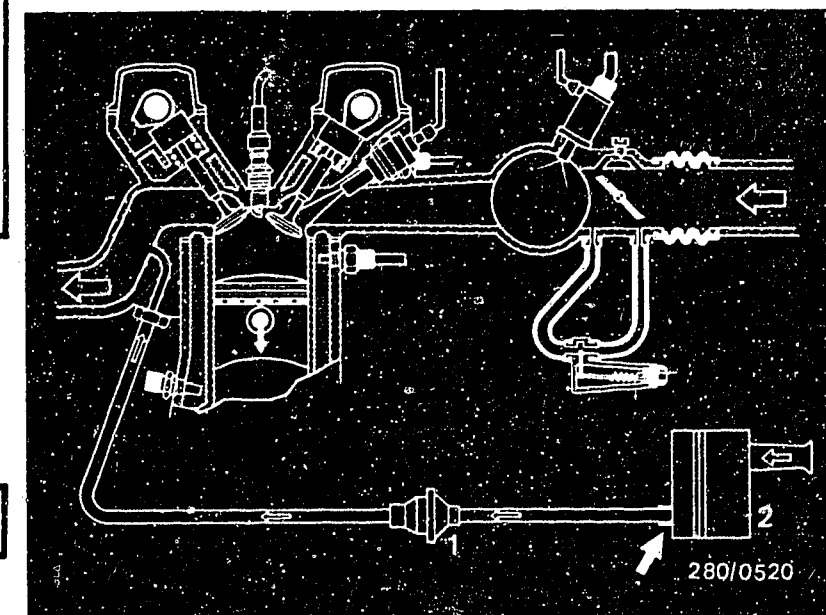
- Exhaust gas adjustment using the exhaust analyzer with engine at normal operating speed and at idle speed. For duration of the exhaust gas measurement and adjustment, switch the exhaust gas system off.
- Idle speed:
 - Manual transmissions and automatic transmissions (in "Park") 800...900 min⁻¹
- CO-adjustment:
 - Model for Europe: less than 1.0 vol.%CO
 - Model for Sweden/Switzerland: A secondary-air induction system is installed in these vehicles because of certain exhaust gas regulations.
- Test specification:
 - CO-setting: 0.2...0.4 vol.%CO (with hose on the air valves).
 - Setting if there is a defect: CO-setting: 0.3...1.0 vol.%CO with the air valve hose taken off and sealed.
- When adjusting the idle speed and CO, inactivate the secondary-air induction system. To do this, disconnect the hose between the air valve and the air filter at the air filter (arrow) and seal it tightly with a plug. When operating the vehicle in countries without more stringent exhaust gas regulations, it is not necessary to inactivate the secondary-air induction system.

Continued on L15/L16



1=CO-adjusting screw
2=Idle-speed adjusting screw

1=Air valve (non-return valve)
2=Air filter



L13

Idle and CO-adjustment
BMW 318i, 518i



L14

Idle and CO-adjustment
BMW 318i, 518i



Idle and CO-adjustment (continued)

● For all vehicles:

If the CO-level is too high, adjust the bypass screw (CO-adjusting screw) in the air-flow sensor by one half turn counterclockwise (socket hex screw, AF 5). Recheck the idle speed and the CO-level once again. If need be, make corrections in several steps. After adjustment, use a new (red) plug (1 280 508 012).

yes

Continued on L17/L18

L15

Idle and CO-adjustment
BMW 318i, 518i



L16

Idle and CO-adjustment
BMW 318i, 518i



Idle and CO-adjustment (continued)

yes

Is the auxiliary-air device
O.K. mechanically?

Open passage:

- cold → open?
- warm → closed?
- Does the engine speed drop
when the hose is clamped
off? (cold engine).

no

Testing:

- Visual inspection of the auxiliary-air device:
Disconnect the hoses and look through. (If
necessary, use a small mirror to do so.) When
closed, the cross-section must be partially
open, when warm it must be closed. If not,
take out and replace the auxiliary-air device.
- Functional test of the auxiliary-air device:
With the engine cold, clamp off the hose to
the auxiliary-air device. The engine speed
must drop off. With the engine warm, clamp off
the hose to the auxiliary-air device. The
engine speed must not drop off noticeably.
Otherwise, take out and replace the auxiliary-
air device. (Watch the direction of through-
flow.)

yes

Is the electrical operation of
the auxiliary-air device
(voltage supply, ground lead,
resistance value) O.K.?

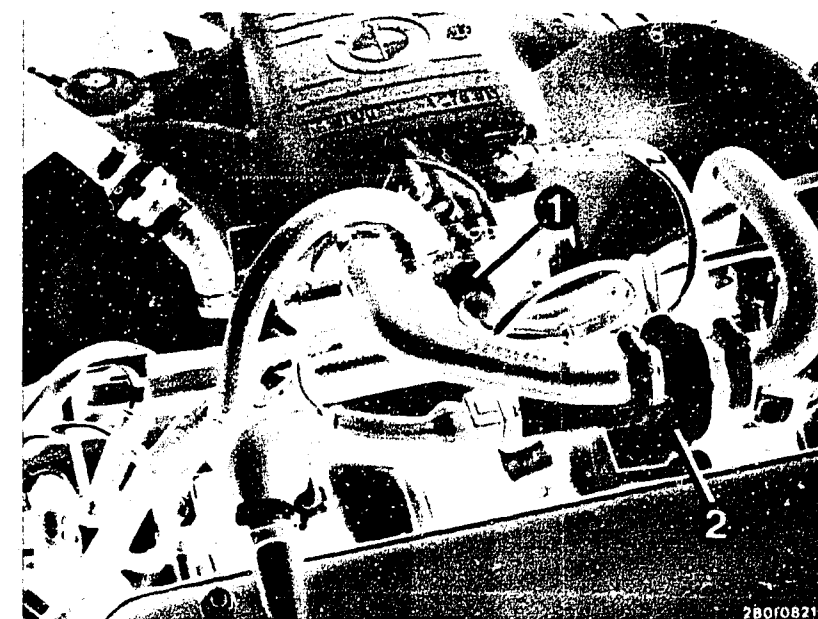
no

Start the engine.

- Voltage at the lead plug min. 12 V. If not,
check the following leads for continuity
(specified value approx. 0 Ω).
- From Term. 26 to the ground terminal output
stage
- From Term. 9/2 to the control unit plug
Term. 9
- Resistance of the auxiliary-air device
30...65 Ω (lead plug disconnected).
If the resistance is not within tolerance,
take out and replace the auxiliary-air device.

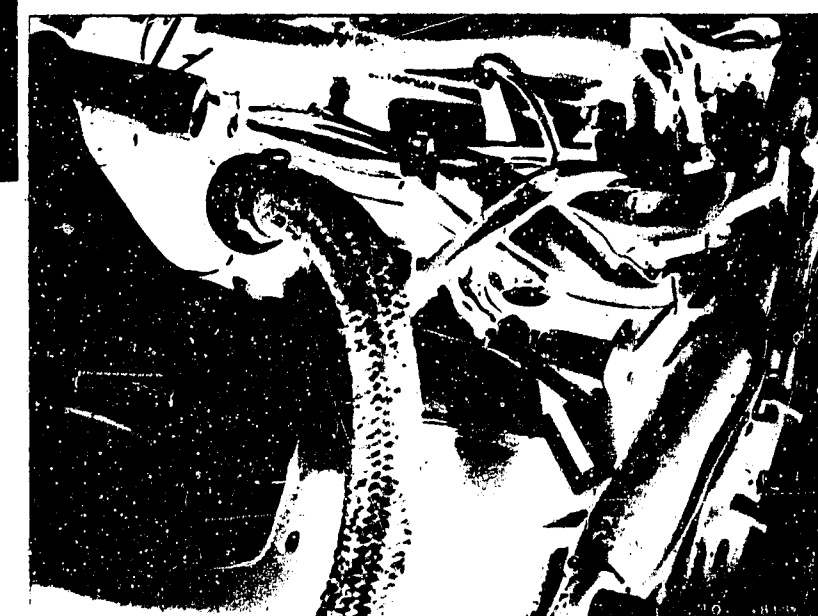
yes

Continued on L19/L20



2=Auxiliary-air device

Arrow=Ground terminal, output stage



L17

Idle and CO adjustment
BMW 318i, 518i



L18

Idle and CO adjustment
BMW 318i, 518i



Idle and CO-adjustment (continued)

yes

Is the air-flow sensor mechanically and electrically O.K.?

Is the resistance within tolerance?
Between Term. 8 and Term. 9:
160...300 Ω

Between Term. 7 and Term. 5
(deflect air-flow sensor flap):
60...1000 Ω

no

Testing:

Release the clamps on the air filter.
Lift off the upper portion of the air filter.

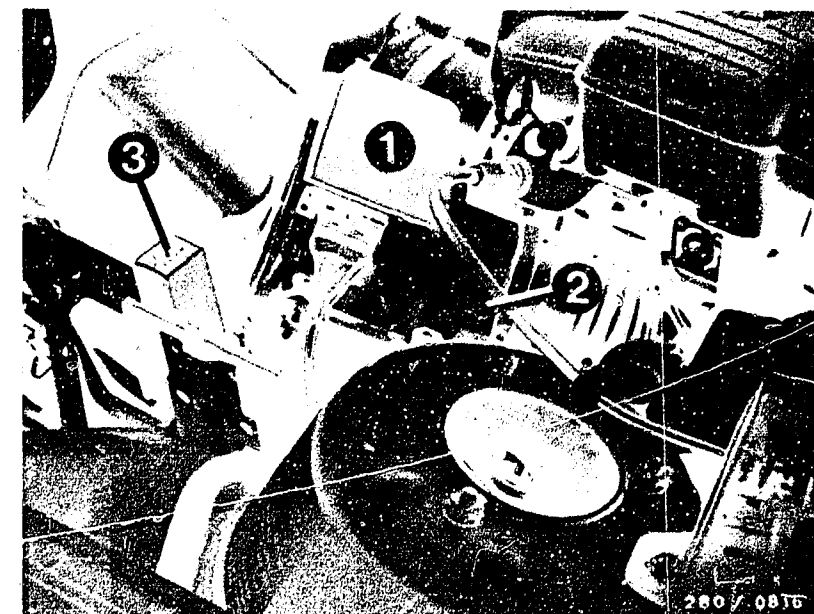
- Check the air-sensor flap for easy movement
Open the air-flow sensor flap manually. It must be uniformly easy to open the air-flow sensor flap as far as the stop, and the flap must then close again as far as the stop by itself. The air-flow sensor flap must not stick when opening.
- Check the air-flow sensor mechanically
Watch for signs of grinding. If the air-flow sensor is very dirty inside, clean it and rub it out with a lint-free cloth. If there are signs of grinding, the air-flow sensor must be taken out and replaced.
The air-flow sensor flap must return to the at-rest position. If not, the stopper or the air-flow sensor flap is bent out of shape. The air-flow sensor must be taken out and replaced.
- Check resistances
Connect an ohmmeter to Term. 8 and Term. 9 on the air-flow sensor.
Test specification: 160...300 Ω
Connect an ohmmeter to Term. 7 and Term. 5 of the air-flow sensor.
Deflect the air-flow sensor flap.
Test specification: 60...1000 Ω

N. B.!

On completion of the test, the air filter and the air-flow sensor must be put back together.

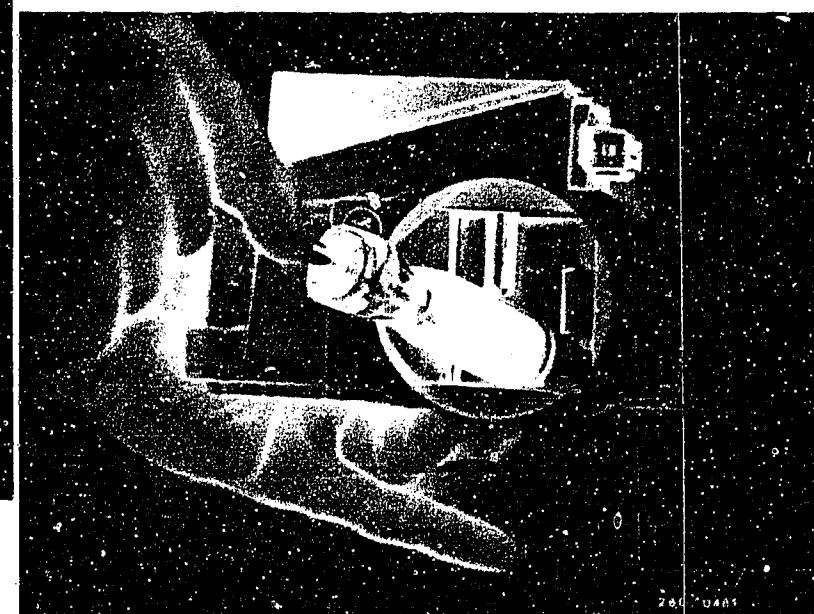
yes

Continued on L21/L22



1=Air-flow sensor
2=CO-adjusting screw

Pressing on the sensor flap in the air-flow sensor



L19

Idle and CO adjustment
BMW 318i, 518i



L20

Idle and CO adjustment
BMW 318i, 518i



Idle and CO-adjustment (continued)

yes

Is the value measured for CO below tolerance?

Model for Europe:
max. 1.0 vol.%CO

Model for Switzerland/Sweden:
max. 0.4 vol.%CO

Is the electric starting valve O.K.?

no

- Check the electric starting valve for leaks:

In the engine:

Clamp off the fuel delivery line at the electric starting valve. If the engine then runs smoothly, take out and replace the electric starting valve.

Taken out of the vehicle:

Take out the electric starting valve (Caution: Fire hazard!) The fuel and the electrical lines remain connected. (Place a catch basin under the starting valve!) Build up the fuel pressure (disconnect the control relay, insert a jumper cable between Term. 87b and Term. 30 in the connection socket.)

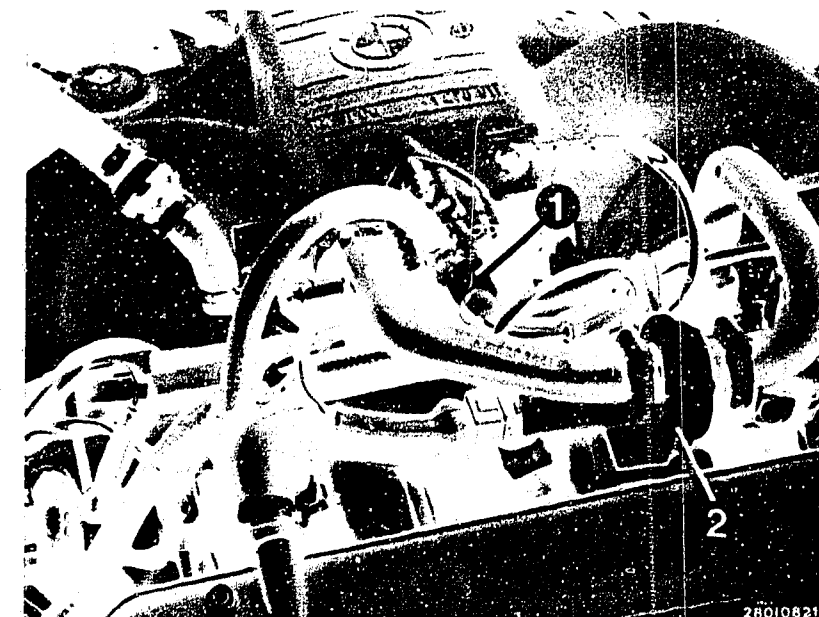
- Test specification: It is permissible for a maximum of one drop to form within one minute at the valve opening.

Caution!

Be absolutely certain to remove the jumper after completion of the test and to plug the control relay back on.

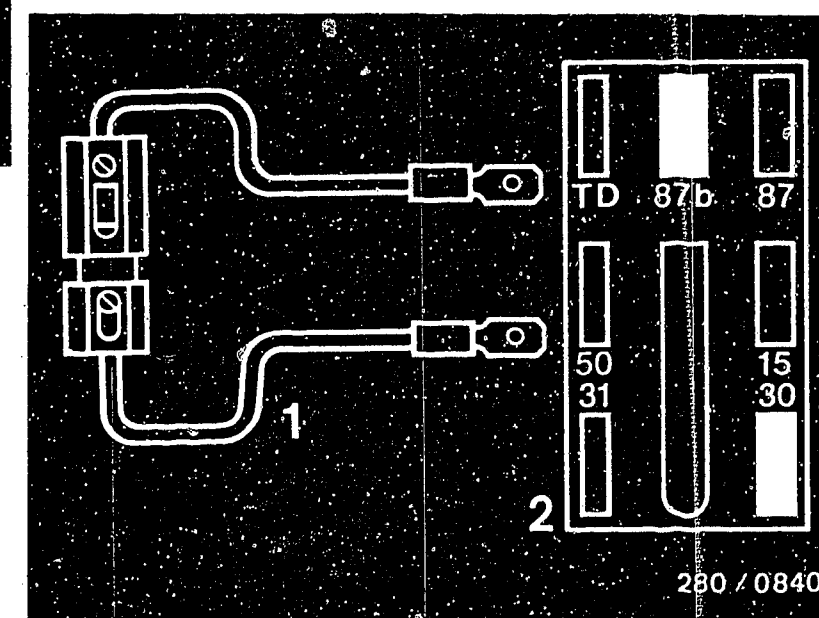
yes

Continued on L23/L24



1=Electric starting valve (blue plug)

1=Jumper cable with fuse holder and 10 A fuse (user fabricated)
2=Top view of connection socket



L21

Idle and CO adjustment
BMW 318i, 518i



L22

Idle and CO adjustment
BMW 318i, 518i



Idle and CO-adjustment (continued)

yes

Is the value measured for CO
above

0.2 vol.%CO

Has the air intake system been
checked for leaks at 0.3 bar
gauge pressure?

no

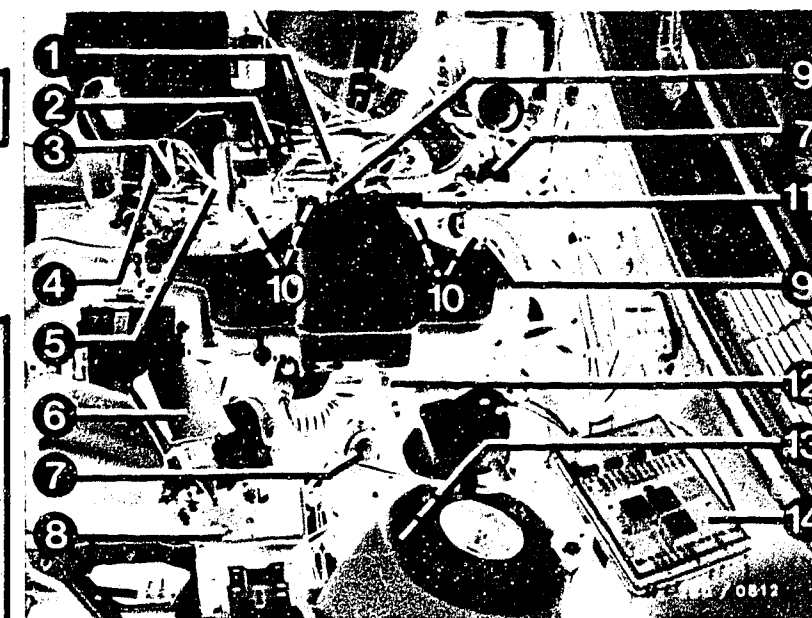
yes

Continued on M3/M4

• Testing for leaks:

Seal off the exhaust pipe. Release the clamps at the air filter. Lift off the top part of the air filter and seal the air-flow sensor channel. Disconnect the hose after the auxiliary-air device and, using a compressed air gun, blow air (0.3 bar gauge pressure) into the intake manifold. Seal off the auxiliary-air device connection. In so doing, open the throttle valve completely. Using soapy water, spray or brush on all seal locations. Leaks can also occur at the following points on the engine: The oil dipstick has not been inserted firmly, the cover seal for the oil filling pipe is defective, etc. Bubbling or foaming indicates leaks.

Continued on M1/M2



Model for Europe

- 1=Electric starting valve
- 2=Auxiliary-air device
- 3=NTC II
- 4=Thermotime switch
- 5=Pressure regulator
- 6=Air-flow sensor
- 7=Fuel-line-pressure damper
- 8=Control relay
- 9=Ground terminals
- 10=Electric fuel-injection valves
- 12=Throttle valve switch

L23

Idle and CO adjustment
BMW 318i, 518i



L24

Idle and CO adjustment
BMW 318i, 518i



Idle and CO-adjustment (continued)

yes

Continued on M3/M4

Model for Sweden/Switzerland:

The secondary-air induction system has been installed here as an additional measure to reduce the toxic substances in the exhaust gas.

• Testing for leaks:

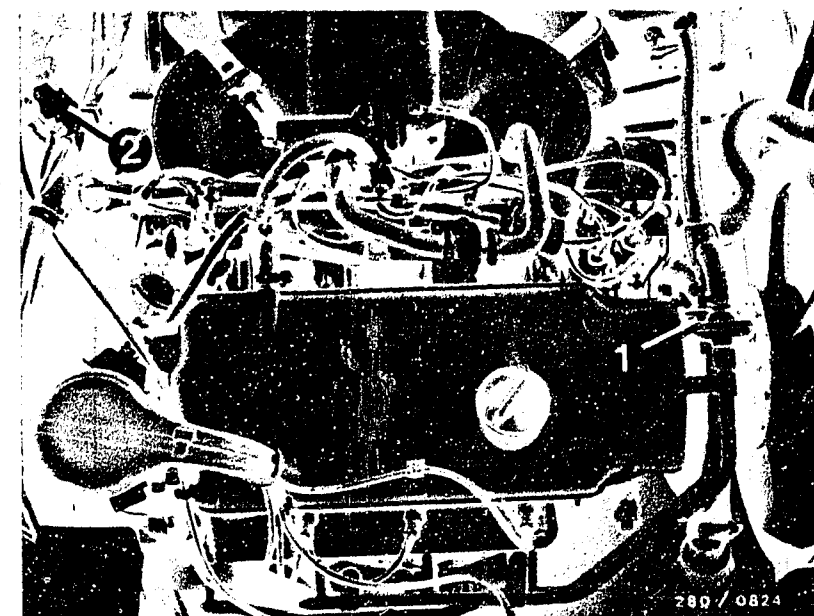
In addition, the lines for the secondary-air induction system and the air valves must be checked.

Model for the US:

Because of the strict exhaust gas regulations in the USA, a lambda closed-loop control with a 3-bed catalytic convertor must be installed in these engines. In addition, the USA model has an idle actuator instead of the auxiliary-air device, i.e., an idle speed control built by VDO.

• Testing for leaks:

In addition, the hoses for the idle speed control system must be checked.

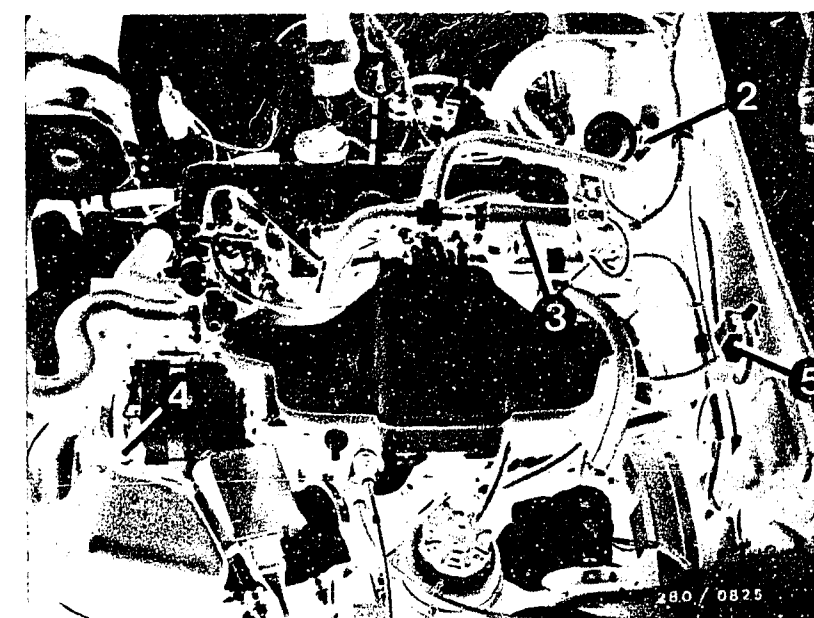


Model for Sweden/Switzerland

1=natural aspiration air valves
2=Solenoid-operated valve

Model for US

1=Lambda sensor
2=Sensor connection
3=Idle actuator (VDO)
4=Pressure sensor (altitude sensor)
5=Solenoid-operated valve



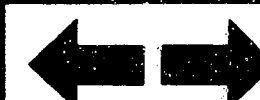
M1

Idle and CO adjustment
BMW 318i, 518i



M2

Idle and CO adjustment
BMW 318i, 518i



Idle and CO-adjustment (continued)

yes

Have the CO and idle speed been correctly set?
(only for the model for EU/S/
Switzerland)

Test specification:

Idle speed:
800...900 min⁻¹

CO-level

Europe:

Less than 1.0 vol.%CO

Sweden/Switzerland:

0.2...0.4 vol.%CO

Are these test specifications being met?

no

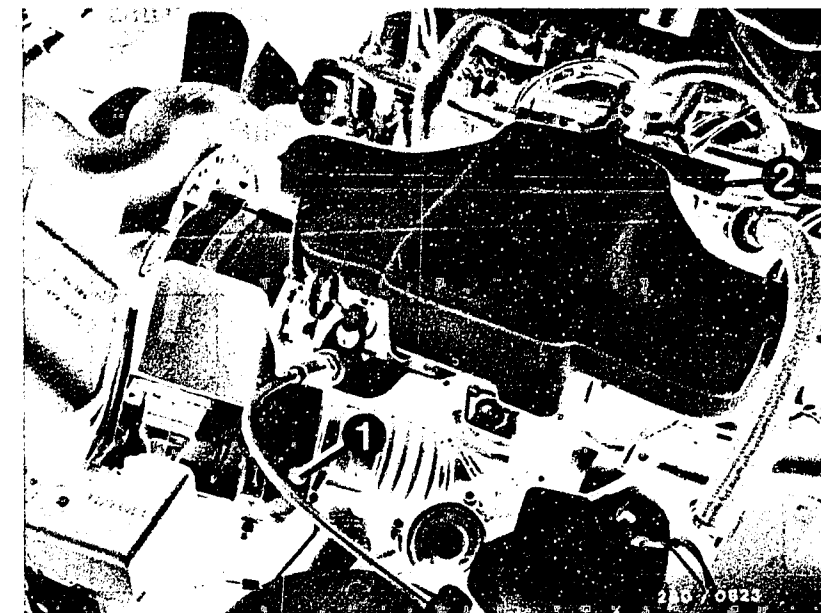
Adjustment of CO and idle speed

- Exhaust gas adjustment using the exhaust analyzer with engine at normal operating speed and at idle speed. For duration of the exhaust gas measurement and adjustment, switch the exhaust gas system off.
- Idle speed:
Manual transmissions and automatic transmissions (in "Park")
800...900 min⁻¹
- CO-adjustment:
Model for Europe: less than 1.0 vol.%CO
Model for Sweden/Switzerland:
A secondary-air induction system is installed in these vehicles because of certain exhaust gas regulations.
- Test specification:
CO-setting: 0.2...0.4 vol.%CO (with hose on the air valves)
- Setting if there is a defect:
CO-setting: 0.3...1.0 vol.%CO with the air valve hose taken off and sealed.
- When adjusting the idle speed and CO, inactivate the secondary-air induction system. To do this, disconnect the hose between the air valve and the air filter at the air filter (arrow) and seal it tightly with a plug. When operating the vehicle in countries without more stringent exhaust gas regulations, it is not necessary to inactivate the secondary-air induction system.

Idle speed cannot be adjusted.

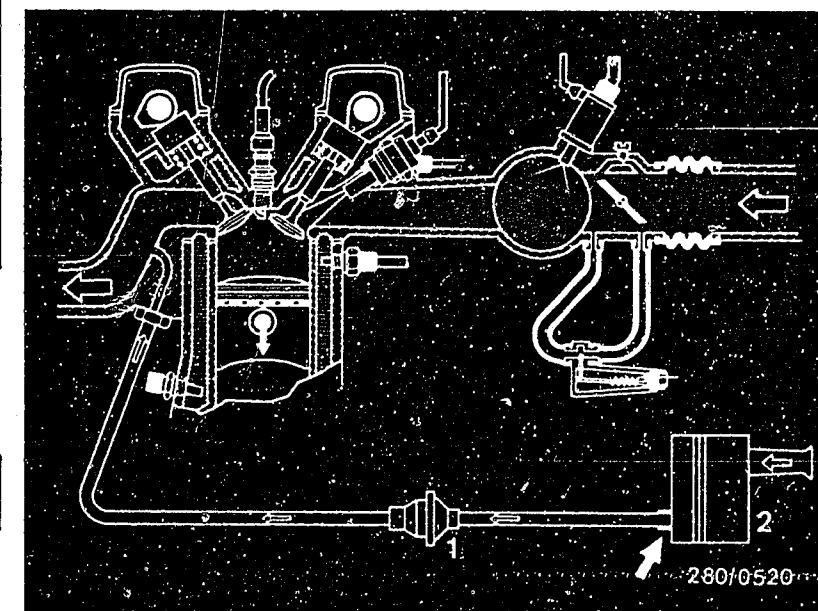
yes

Continued on M5/M6



1=CO-adjusting screw
2=Idle-speed adjusting screw

1=Air valve (non-return valve)
2=Air filter



M3

Idle and CO adjustment
BMW 318i, 518i



M4

Idle and CO adjustment
BMW 318i, 518i



Idle and CO-adjustment (continued)

yes

- For all vehicles:
If the CO-level is too high, adjust the bypass screw (CO-adjusting screw) in the air-flow sensor by one half turn counterclockwise (socket hex screw, AF 5). Recheck the idle speed and the CO-level once again. If need be, make corrections in several steps.
After adjustment, use a new (red) plug (1 280 508 012).

Only for model for EU/S/
Switzerland

Checking of the customer
complaint

"Idle speed and CO-adjustment
too low or too high"

has been completed.
Has the customer complaint
been corrected?

no

Other possible defects:

- The customer complaint has been incorrectly identified. (See Coordinates C3...C8).
If the defect has not been identified using the "Targeted trouble-shooting", see "Detailed trouble-shooting". (Coordinates C3(C4)).
- The engine is not O.K. mechanically (compression, valve setting, valve timing, wear on camshaft).

no

For US model only:

- Is the idle speed control (non-Bosch product) O.K.?
- Is the lambda closed-loop control O.K.?

Check the idle speed control and the lambda closed-loop control (Coordinates G13...H2).

M5

Idle and CO adjustment
BMW 318i, 518i



M6

Idle and CO adjustment
BMW 318i, 518i



After-sales Service

Technical Bulletin

Only for use within the Bosch organization. Not to be communicated to any third party.

CAR ALARM II - 0 335 411 901 -

in vehicles with
L-Jetronic (L1, LE1, LE2), Motronic,
TCI-h, TI-h, TCI-i, TI-i

VDT-I-335/108 En

12.1983

Replaces Ed. 6.1981

and VDT-I-335/110, 10.1981

VDT-I-335/111, 11.1981

VDT-I-261/101, 7.1981

VDT-I-227/106, 5.1981

VDT-I-280/103, 7.1981

In cases where Car Alarm II is retrofitted in vehicles the engines of which are fitted with L-Jetronic, Motronic, TCI-h, TCI-i (trigger box in discrete design) or with TI-h, TI-i (trigger box in hybrid design), then terminal 1 of the ignition coil must not be connected to terminal "C" of the alarm relay. When the alarm system is switched on, terminal "C" of the alarm relay is switched internally to vehicle ground. This would mean that when attempts are made to start the vehicle with the alarm switched on, the ignition coil and the trigger box/control units of the systems in question would be destroyed.

For vehicles with Motronic, we formerly recommended switching off the supply voltage to the Motronic control unit. Please do not switch this supply off any more. There is now a new circuit whereby the electric fuel-pump relay is switched off via the "primed" alarm system.

This also means though, that full protection against theft is no longer possible as would normally be the case with the ignition switched off and with the alarm installation primed.

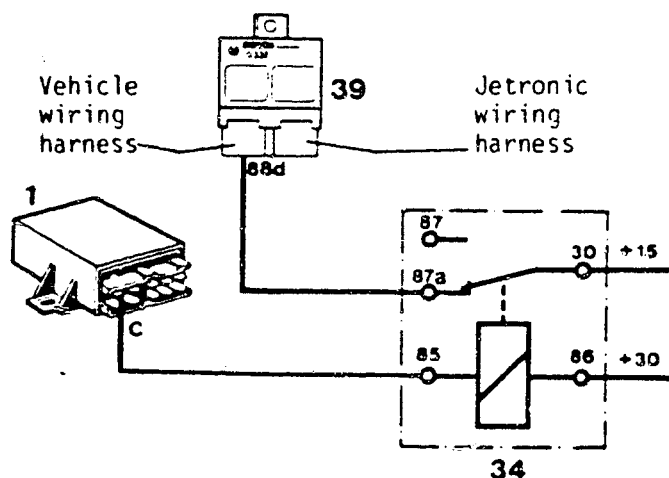
Circuits have now been developed which ensure complete theft protection for vehicles with the systems mentioned above.

Circuit 1

Description of the circuit for vehicles with L-Jetronic

Open-circuit the line from the relay combination terminal 88d to the fuel pump with an additional relay (34). In this way the supply voltage to the fuel pump will be switched off when the alarm system is "primed," i.e. no more fuel is supplied.

- 1 Alarm relay
- 34 Additional relay 0 332 204 150
(transfer contact relay, used
here as break contact)
- 39 Relay combination of L-Jetronic



BOSCH

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N1

Technical Bulletin

BMW 318i, 518i

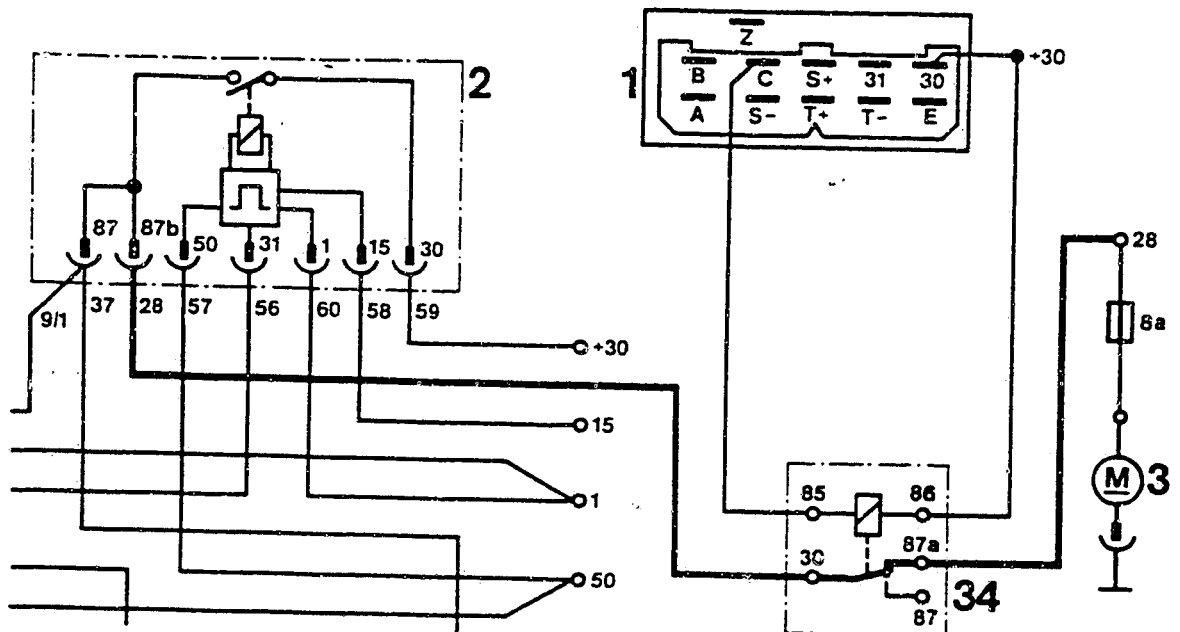


Circuit 2

Description of the circuit for vehicles with LE1/LE2-Jetronic

Open-circuit the line from the control relay terminal 87b to the fuel pump with an additional relay (34). In this way the fuel pump will be switched off when the alarm system is primed, i.e. no more fuel will be supplied.

Circuit diagram for the LE version



1 = Alarm relay
2 = Control relay for LE versions

3 = Electric fuel pump
34 = Additional relay
0 332 204 150

Circuit 3

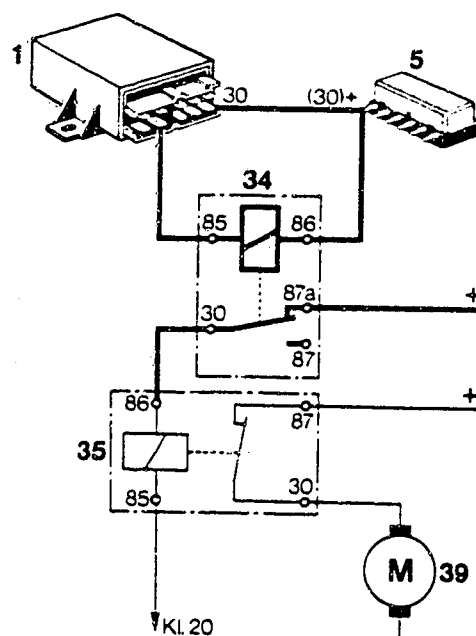
Description of the circuit for vehicles with Motronic (e.g. BMW and Porsche)

Formerly, we recommended switching off the supply voltage to the Motronic control unit as a protection against theft. Please do not switch this supply off any more. There is now a new circuit whereby the electric fuel-pump relay is switched off via the "primed" alarm system.



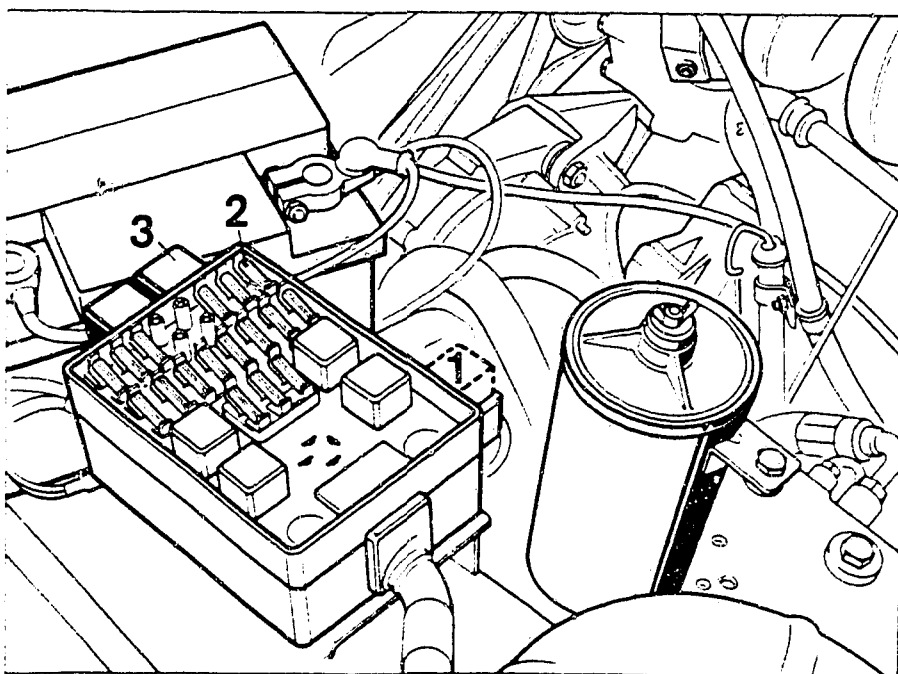
Circuit 3
for vehicles with Motronic

- 1 = Alarm relay
- 5 = Fuse box
- 34 = Additional relay 0 332 204 150
- 35 = Electric fuel-pump relay
- 39 = Electric fuel pump
- Term.20 = Cable to term. 20 of
Motronic control unit



Kl. = terminal

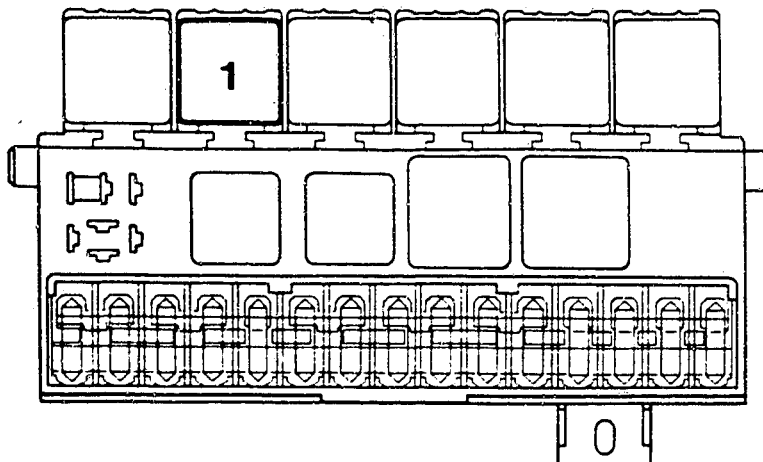
Installation position of the relay for the electric fuel pump in a BMW



- 1 = Electric fuel-pump relay (installation position in vehicles up to date of construction 8.1980)
- 2 = Fuse (16 A) for electric fuel pump
- 3 = Electric fuel-pump relay (installation position in vehicles as from date of construction 8.1980)



Installation position of the electric fuel pump in a Porsche



Central electrics

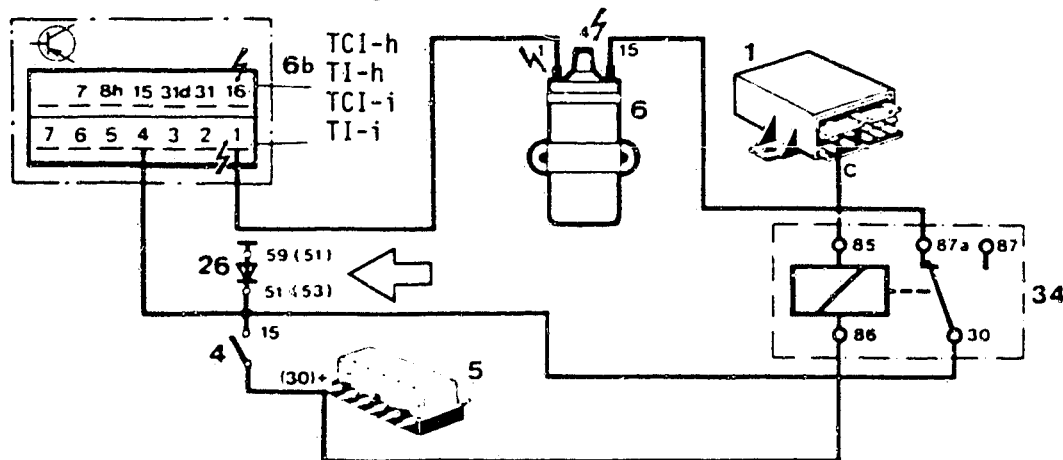
1 = Electric fuel-pump relay

Circuit 4

Description of the circuit for vehicles with:

- standard fitted TCI-h, TCI-i (trigger box in discrete form)
TI-h, TI-i (trigger box in hybrid form);
- retrofitted TCI-h, providing the vehicles have a resistance cable between the ignition-and-starting switch and ignition-coil terminal 15;
- retrofitted TCI-h, if the existing resistance cable in the vehicle between the ignition-and-starting switch and ignition-coil terminal 15 has been replaced by a new cable (1.5 mm²).

Open-circuit the line to ignition-coil terminal 15 with an additional relay (34). A protecting diode (26) must also be wired between the ignition-and-starting switch terminal 15 and ground.



1 = Alarm relay

4 = Ignition-and-starting switch

5 = Fuse box

6 = Ignition coil

6b = Trigger box TCI-h/TI-h, TCI-i/TI-i

26 = Protecting diode 0 212 911 001

34 = Additional relay 0 332 204 150

(change-over contact, here as NC-contact)

Please note: As from date of manufacture FD 832, the terminal designations of the protecting diode (26) have been changed. Old designations in brackets.



Circuit 5

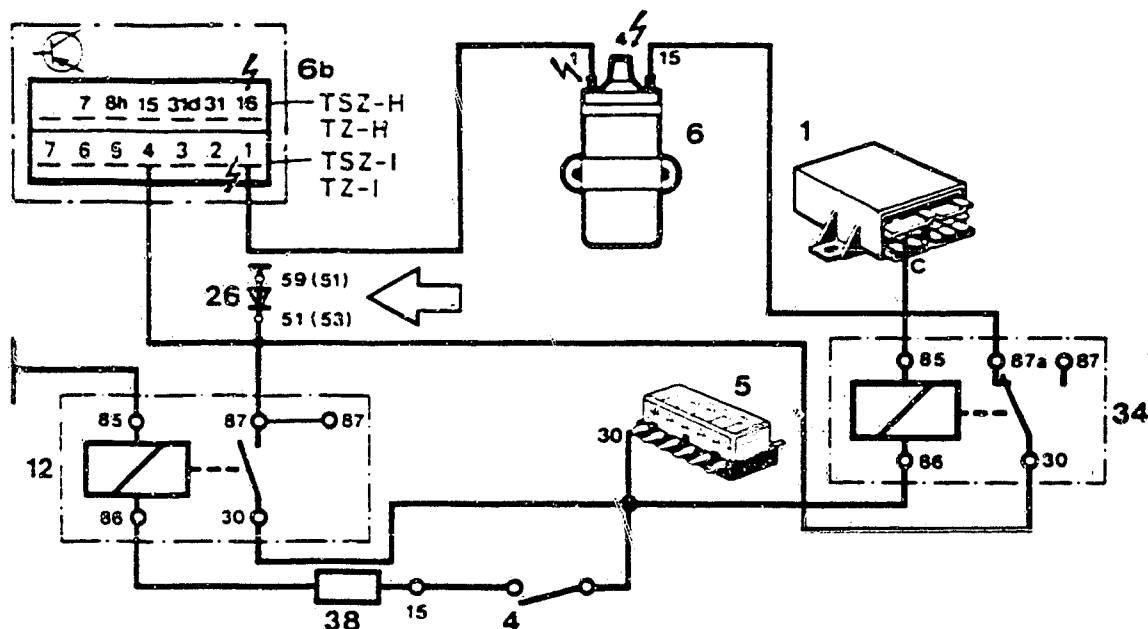
Description of the circuit with:

- retrofitted TCI-h, TI-h, if the resistance cable (38) remains in the vehicle, and if a relay (12) has already been fitted for controlling the positive current to the TCI/TI trigger box (6b) and the ignition coil (6).

Open-circuit the line between terminal 87 and both relay (12) and ignition coil (6), terminal 15 with an additional relay (34).

A protecting diode (26) must also be wired between relay (12) terminal 87 and ground.

The additional relay is controlled via terminal "C" of the alarm relay.



- 1 = Alarm relay
- 4 = Ignition-and-starting switch
- 5 = Fuse box
- 6 = Ignition coil
- 6b = Trigger box (TCI-h/TI-h,
TCI-i/TI-i)

- 26 = Protecting diode 0 212 911 001
- 34 = Additional relay 0 332 204 150
(change-over contact, here as
NC-contact)
- 38 = Resistance cable (in vehicle
wiring harness)

Please note: As from date of manufacture 832 the terminal designations of the protecting diode (26) have been changed (see arrow). Old designations in brackets.



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Technical Bulletin

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DETERMINATION OF THE TEMPERATURE VALUES
GIVEN IN L-JETRONIC MANUALS

VDT-I-280/108 En
5.1982

We have recently been asked with increasing regularity how accurately the engine temperature must be measured when trouble-shooting on the vehicle.

So far in its L-Jetronic manuals KH/VSK has given three or four different temperatures for testing the temperature sensor:

-10 °C, +20 °C, +40 °C and +80 °C,

and two ranges for the thermo-time switch e.g. 35 °C 8 sec.

below +30 °C and above +40 °C.

Since the temperature range need not be subject to such close tolerances, we propose in future the following more appropriate definition:

- Ambient temperature (approx. +15 °C to +30 °C)
- Engine at normal operating temperature (approx. +80 °C).

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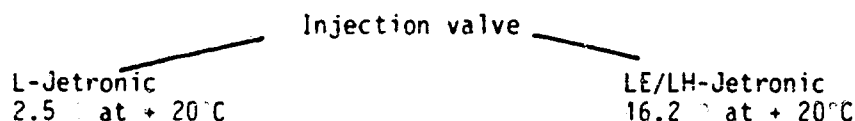
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CODING OF LE/LH-JETRONIC
SOLENOID-OPERATED INJECTION VALVES

VDT-I-280/109 En

5.1982

With the introduction of the LE/LH-Jetronic the internal resistance of the solenoid-operated injection valves has also been changed.



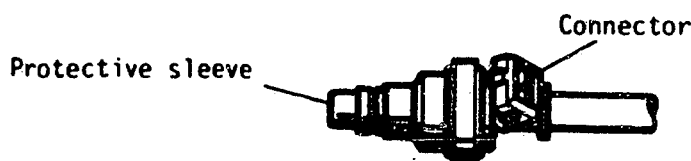
The connector has been left the same for cost reasons and to meet customer wishes.

Caution!

If L-Jetronic injection valves are installed in an LE/LH-Jetronic vehicle, either the control unit or the injection valves will suffer irreparable damage.

Note:

- Install only injection valves with the part number designated for the vehicle.
- As a guide, injection valves with 16.2 Ω internal resistance have a yellow protective sleeve.



- A colour coding (yellow) of the connector (see also VDT-I-280/5) is not generally intended for LE/LH-Jetronic injection valves.

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VDT-I-280/110 En

6.1983

PARTS SET FOR INJECTION VALVES

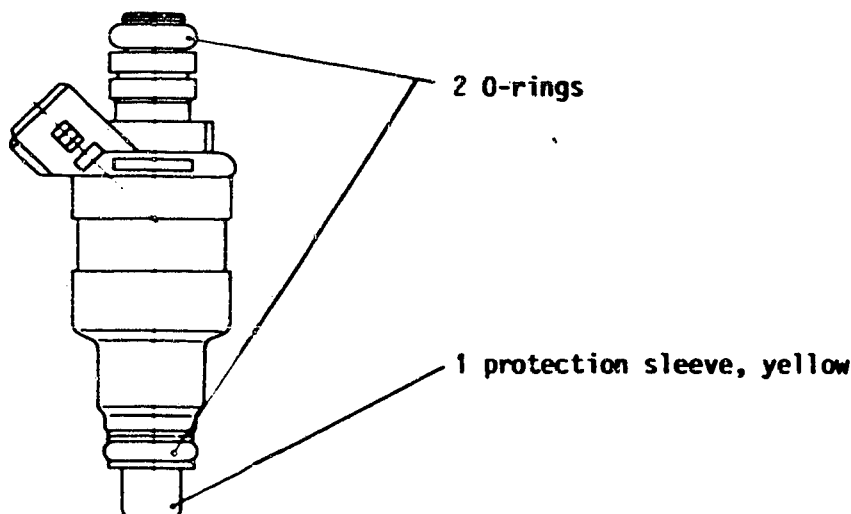
Supersedes 6.1982 edition

0 280 150 2..

AND PRESSURE REGULATORS 0 280 160 2..

A common parts set is available for the L-Jetronic/LE-Jetronic solenoid-operated injection valves and pressure regulators with the new method of connection.

Contents for 1 injection valve:



Contents for 1 pressure regulator:
1 O-ring
1 supporting plate

Since the above-mentioned parts are subjected to extreme temperature stress, they should be exchanged for new parts whenever servicing is carried out.

"Unmetered air" sucked in through injection-valve seals which are not tight, is a frequent case for servicing.

The parts set has the part number 1 287 010 704 and will in future be listed in the service parts microfiche under solenoid-operated injection valves (see EE 00 under 0 280..).

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PLUG CONNECTORS FOR
JETRONIC COMPONENTS
Parts sets

VDT-I-280/111 En

11.1984

(supersedes edition 11.1982)

Parts sets are available for replacement of Jetronic plug connectors. These consist of:

- Plug connector housing
- Protective cap (rubber sleeve)
- Contact springs

These parts are listed on microfiche EE...*.

* see microfiche EE00 under 0 280 ..

- Plug, black, 2-pin,
parts set 1 287 013 002 cable connector in conjunction with socket, 2-pin
- Socket, black, 2-pin,
parts set 1 287 013 001 for e.g.

Temperature sensor	0 280 130 0..
Auxiliary-air device	0 280 140 ..
Thermo-time switch	0 280 130 2..
Start valve	0 280 170 ..
Warm-up regulator	0 438 140 ..

- Socket, grey, 2-pin
parts set 1 287 013 003 for:

Solenoid-operated injection valve	0 280 150 ..
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- Socket, black, 3-pin,
parts set 1 237 000 039 for:

Throttle-valve switch 0 280 120 ..

- Socket, black, 5-pin,
parts set 1 287 013 006 for:

Air-flow sensor 0 280 20. ..
(LE version)

- Socket, black, 6-pin,
parts set 1 287 013 004 for

Air-flow sensor 0 280 200 ..

- Socket, black, 7-pin,
parts set 1 287 013 005 for:

Air-flow sensor 0 280 20. ..
Air-mass sensor 0 280 211 ..

The contact springs (minitimers) are also available separately under part no. 1 284 477 026.

The plug-connector housings are only available in the stated colours.

Responsible:

Robert Bosch GmbH

Division KH

Technical After-Sales Service (KH/VKD 2)

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After-sales Service

Motor Vehicle Service Information

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UNIVERSAL TEST ADAPTER

VDT-I-Gen. 1001 En

1.1982

1. Application

The multiplicity of different fuel-injection and ignition systems at present available on the market, as well as the advances in development which can be expected in the future, demand a new testing concept. In order to maintain the outlay for test equipment, and hence the costs, at a reasonable limit we have developed the universal test adapter.

The following systems can be tested using a test-adapter universal unit together with adapter leads suited to the system in question:

1.1 Systems which are already being fitted as series:

- L-Jetronic (1st generation)
- LE-Jetronic (2nd-generation L-Jetronic)
- Motronic (with the new connector designation, refer to the vehicle-specific instructions!)

1.2 Systems whose introduction is planned:

- Motronic with gearbox control
- KE-Jetronic
- Mono-Jetronic
- Electronic ignition system with ignition map (EZF)

2. Delivery dates and Part Numbers

Available as from 2.1982.

2.1 Universal test adapter (basic unit)

Part Number: 0 684 101 801

Designation: ETT 018.01

2.2 System adapter lead for LE-Jetronic (2nd-generation L-Jetronic)

Part Number 1 684 463 123

First application: For BMW 2.5/2.8 l engines as from 9.1981, and for Opel 2.0 l engines (Manta/Rekord) as from 9.1981.

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2.3 System adapter lead for Motronic with new connector assignment.

(Refer to the vehicle-related instructions!)

Part Number : 1 684 463 124

First application: Porsche 944 as from series production, BMW as from about 3.1982 (Europe)

2.4 System adapter lead for L-Jetronic (in preparation)

Further system adapter leads will be made available along with the introduction of the new systems as mentioned above.

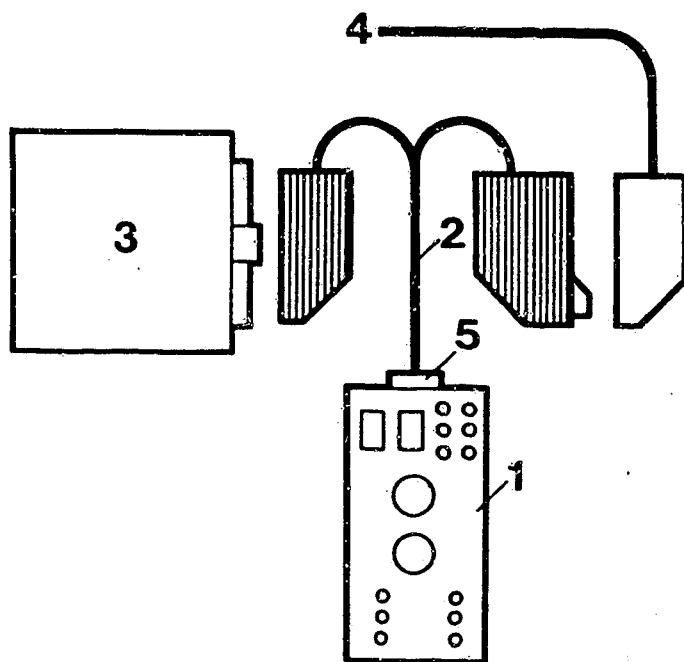
3. Testing procedure

The systems and the components are tested for voltage and resistance values as well as for correct functioning. Evaluation is by means of a multimeter and the Motortester which are connected into the universal test adapter.

Depending upon the complexity of the system, interchangeable adapter lead model 1 or model 2 is provided:

3.1 Adapter lead for peripheral and function testing (Model 1)

The universal test adapter together with the system adapter lead is to be connected to the system wiring harness and to the control unit (e.g. Motronic).
To be tested: Wiring harness with components and control unit.



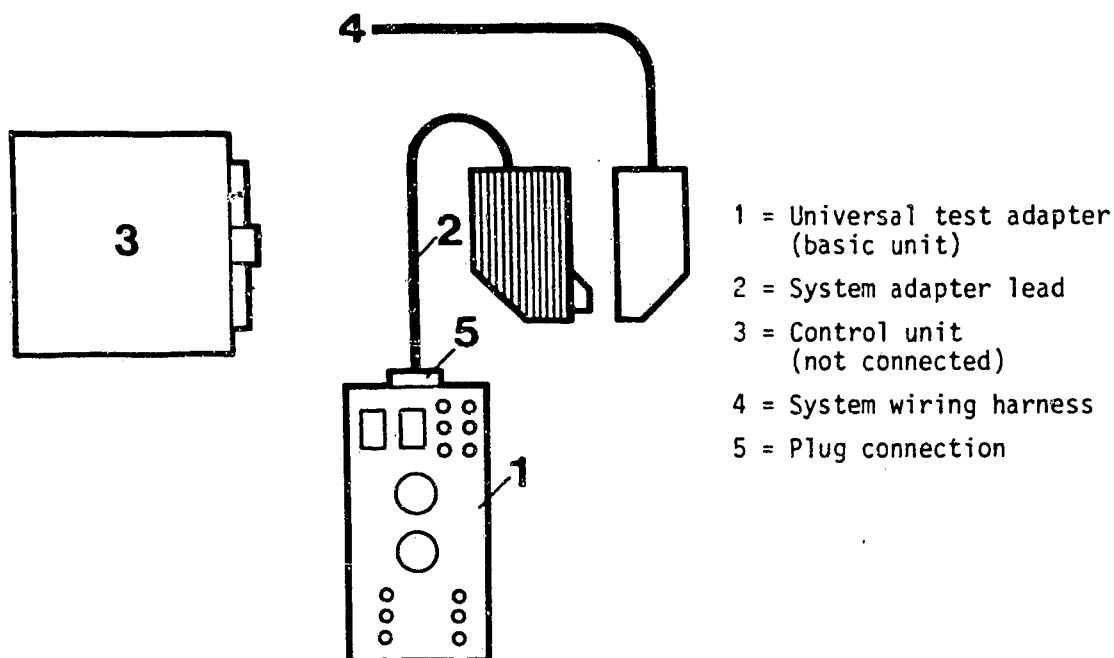
- 1 = Universal test adapter (basic unit)
- 2 = System adapter lead (Y-version)
- 3 = Control unit
- 4 = System wiring harness
- 5 = Plug connection



3.2 Adapter lead for peripheral testing (Model 2)

The universal test adapter with system adapter lead, is only to be connected to the system wiring harness (e.g. LE-Jetronic (2nd-generation L-Jetronic)).

To be tested: Wiring harness with components (without control unit).

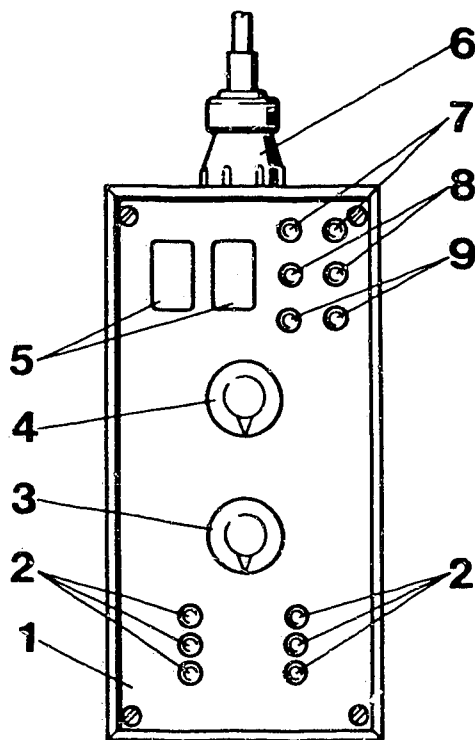


4. Construction of the universal test adapters

The universal test adapter is fitted with 2 program switches footlage and resistance measurement. The measured values are displayed on the multimeter connected to the universal test adapter. For reasons of safety, the voltage and resistance sockets are separated. In order to measure signals (e.g. injection pulses, ignition pulses), it is necessary to connect a Motortester to the measuring cavities (special input).

When carrying out functional tests with the control unit connected, selected push-buttons are pressed in a number of test-program steps in order to simulate a variety of different engine operating conditions the influence of which is evaluated using the Motortester.





- 1 = Universal test adapter (basic unit)
- 2 = Keyboard for simulation of various conditions e.g. engine temperature, throttle position etc.
- 3 = Program switch "Ohm" for resistance measurement
- 4 = Program switch "Volt" for voltage measurement
- 5 = Measurement "cavities" (for the special input from the Motortester)
- 6 = 63-pole plug-in connection for connecting the system adapter lead
- 7 = Measurement sockets (voltage measurement with a multimeter or with the Motortester)
- 8 = Measurement sockets (resistance measurement with the multimeter)
- 9 = Sockets for special functions (not yet allocated)

Notes:

1. The Motronic test adapter (0 684 101 800, ETT 018.00) will continue to be used for Motronic-equipped BMW vehicles (with old connector assignment) up to about year of manufacture 3.1982 (refer to vehicle-specific instructions).
2. Details on the operation of the universal test adapter, and the test specs, are to be found in the vehicle-specific after-sales service instructions.

3. Caution! Change of Part Number:

On the SIS-microfiches OPE-00/J22 (Coordinates A14 and A17) the new Part Numbers are as follows:

Universal test adapter: 0 684 101 801

Adapter lead : 1 684 463 123



After-sales Service

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EXPORT VEHICLES WITH

EMISSION CONTROL SYSTEMS

VDT-I-Gen. 042 En.

12. 1981

K-Jetronic and L-Jetronic

Export vehicles for countries with stringent exhaust emission regulations are equipped with various emission control systems. To meet the legal requirements, these systems are installed either individually or in combination, depending on the model version.

Emission control system installed predominantly in export vehicles

	Sweden	Australia	Canada	USA	Japan
Exhaust-gas recirculation*	●	●	●	(●)	(●)
Secondary-air induction*	●	●	●	(●)	(●)
Secondary-air injection*	●	●	●	(●)	(●)
Catalytic converter*	-	-	-	●	●
Lambda closed-loop control	-	-	-	●	●

The vehicle-related After-Sales Service Instruction Manuals for the K-Jetronic and L-Jetronic describe the construction, function and operating principle of the emission control systems. The influence of these systems should be borne in mind particularly when adjusting the idle speed and CO concentration.

Export vehicles are sometimes also encountered in countries which do not have particularly stringent exhaust emission legislation. This Service Information publication summarizes the various emission control systems and provides information for the After-Sales Service in countries with exhaust emission legislation which does not require such emission control systems or unleaded fuel.

* Not made by Bosch

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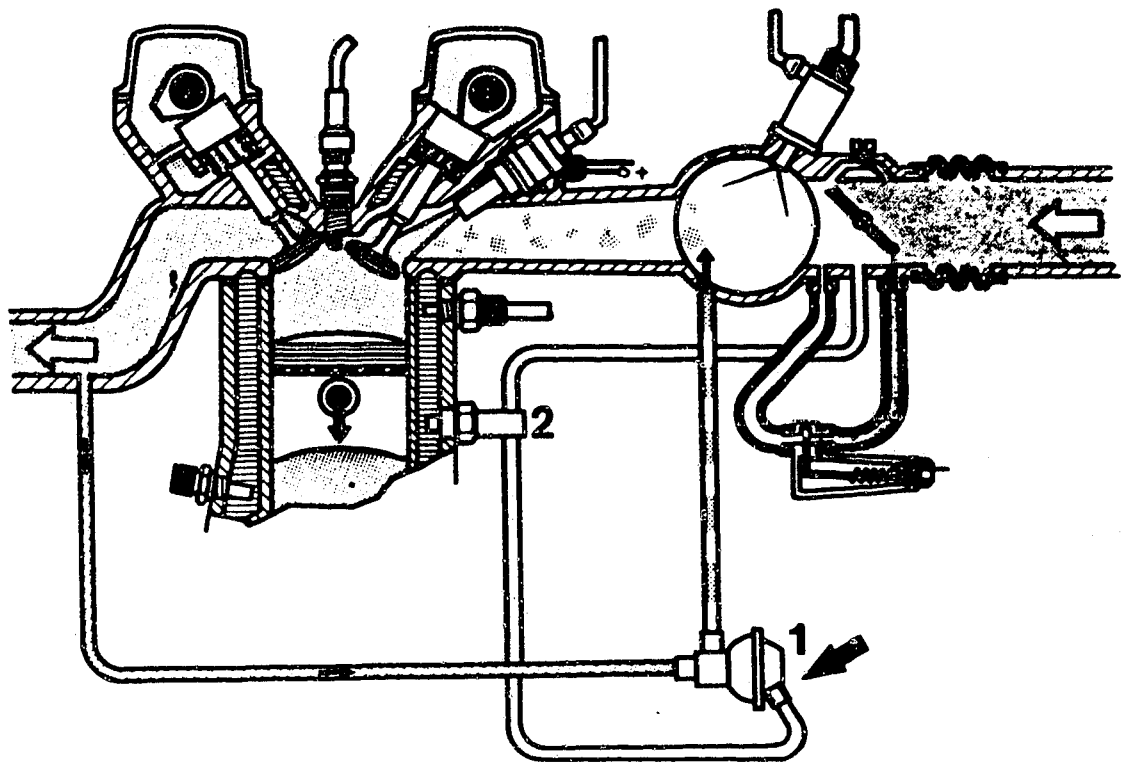
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1. Exhaust-gas recirculation (EGR)



1 = Exhaust-gas recirculation valve 2 = Thermo-valve

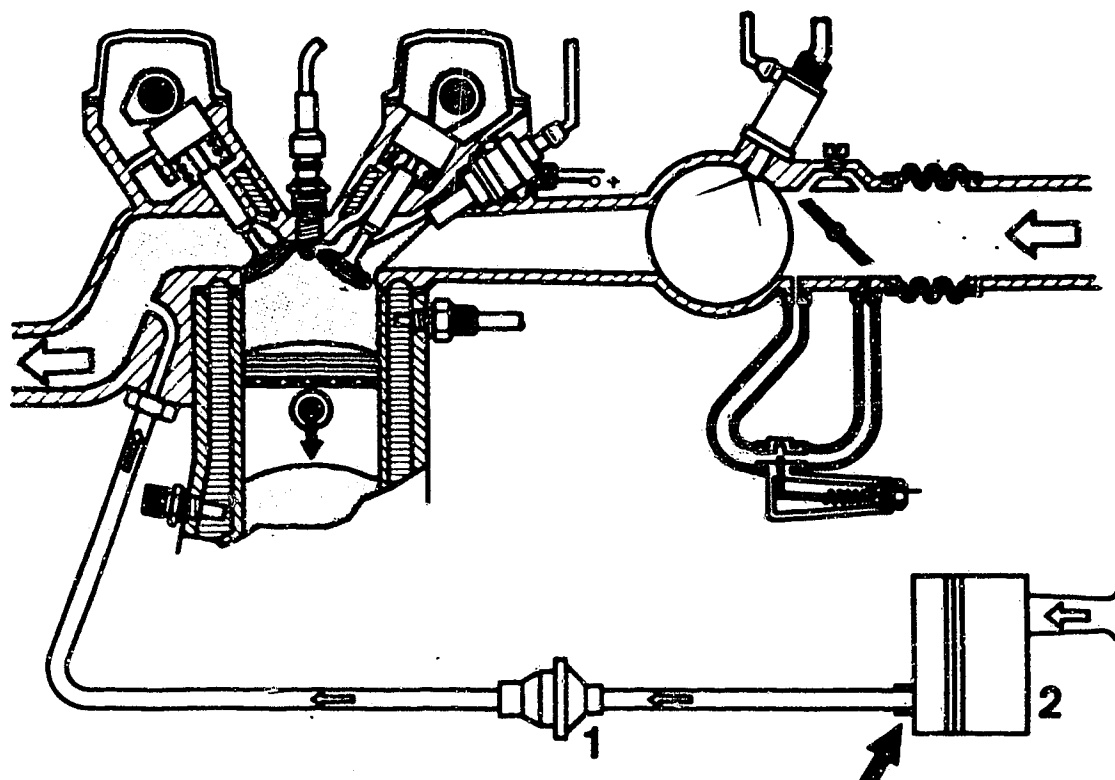
Some of the exhaust gas is returned to the intake manifold via a vacuum-controlled exhaust-gas recirculation valve. This recirculation of exhaust gas into the combustion chamber lowers the combustion temperature and reduces the emission of nitrogen oxides (NO_x). The thermo-valve and the position of the vacuum tapping port on the throttle-valve assembly ensure that exhaust gas is only recirculated when the engine is warm and only at part load. There is a reduction in engine speed of about 200 min⁻¹. Exhaust-gas recirculation is inoperative at idle, full-load and when the engine is cold.

When testing or adjusting the idle speed and CO concentration, remove and seal off the vacuum control line (arrow) on the exhaust-gas recirculation valve in order to ensure that the exhaust-gas recirculation system is inoperative.

In countries without stringent exhaust emission legislation it is not necessary to shut down the system.



2. Secondary-air induction (e.g. Volvo Pulsair system)



1 = Non-return valve

2 = Air filter

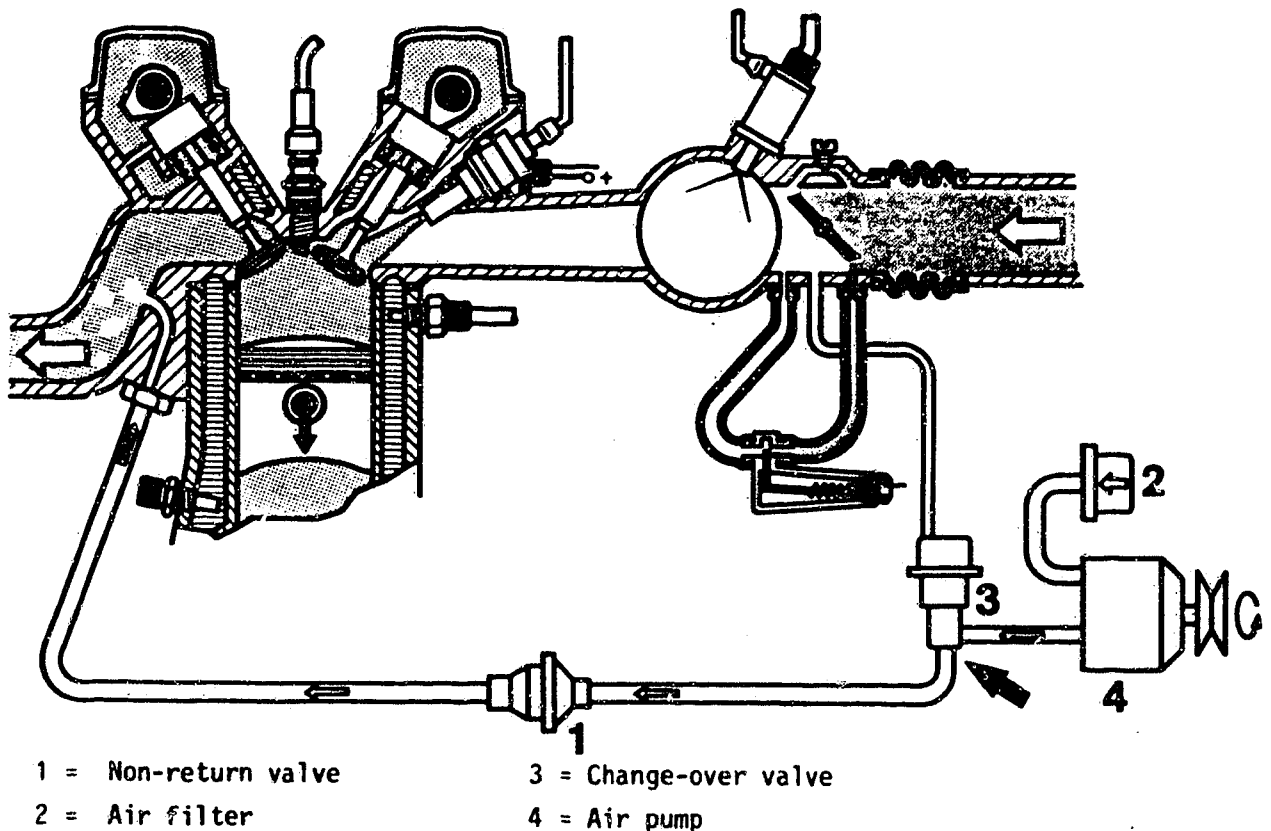
The pulsating alternation between overpressure and depression in the flow of exhaust gas inducts fresh air into the exhaust ports via a non-return valve. Unburned residues of carbon monoxide (CO) and hydrocarbons (HC) are partially after-burned, leading to fewer pollutants in the exhaust gas.

When testing or adjusting the idle speed and the CO concentration, the secondary-air induction system must be rendered inoperative. To do this, remove the hose between the non-return valve and the air filter on the air filter (arrow) and seal off tight with a plug.

In countries without stringent exhaust emission legislation it is not necessary to shut down the secondary-air induction system.



3. Secondary-air injection



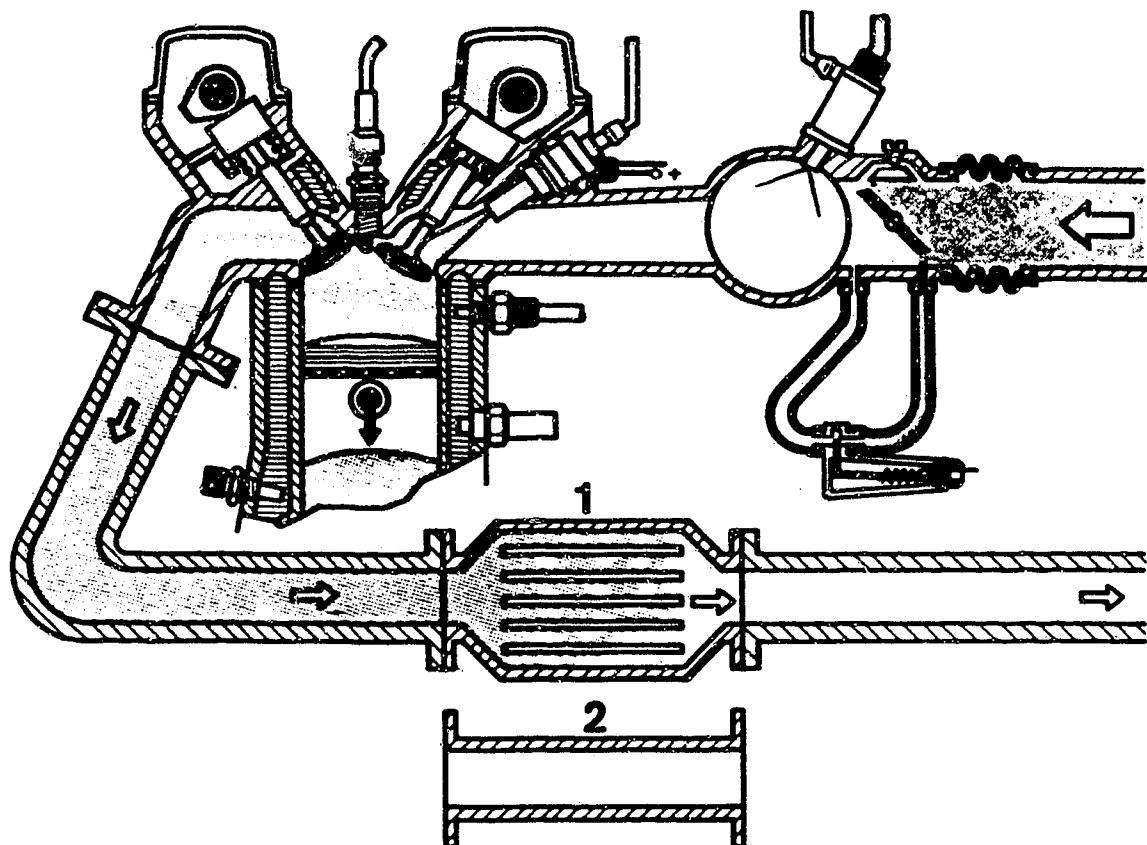
An air pump driven by the engine inducts fresh air through the air filter and forces it via a non-return valve into the exhaust ports. As in the case of secondary-air induction, there is a partial after-burning of the CO and HC residues. This makes the exhaust gas cleaner. A vacuum-controlled change-over valve controls the operation of the secondary-air injection system.

When testing or adjusting the idle speed and the CO concentration, shut down the secondary-air injection system. To do this, remove the hose from the outlet of the change-over valve (arrow) and seal off tight with a plug.

In countries without stringent exhaust emission legislation it is not necessary to shut down the secondary-air injection system.



4. Catalytic converter



1 = Catalytic converter

2 = Intermediate pipe

The single-bed catalyst installed in the exhaust system in export vehicles (also with lambda closed-loop control) reduces all three pollutants CO, HC and NOx to a minimum. The catalytic surface triggers chemical reactions of the pollutants, rendering them non-toxic.

Important: Proper operation only possible in conjunction with unleaded fuel (at present only in USA and Japan).

When testing or adjusting the idle speed and the CO concentration, the catalytic converter can be neglected since the exhaust-measuring point is upstream of the catalyst.

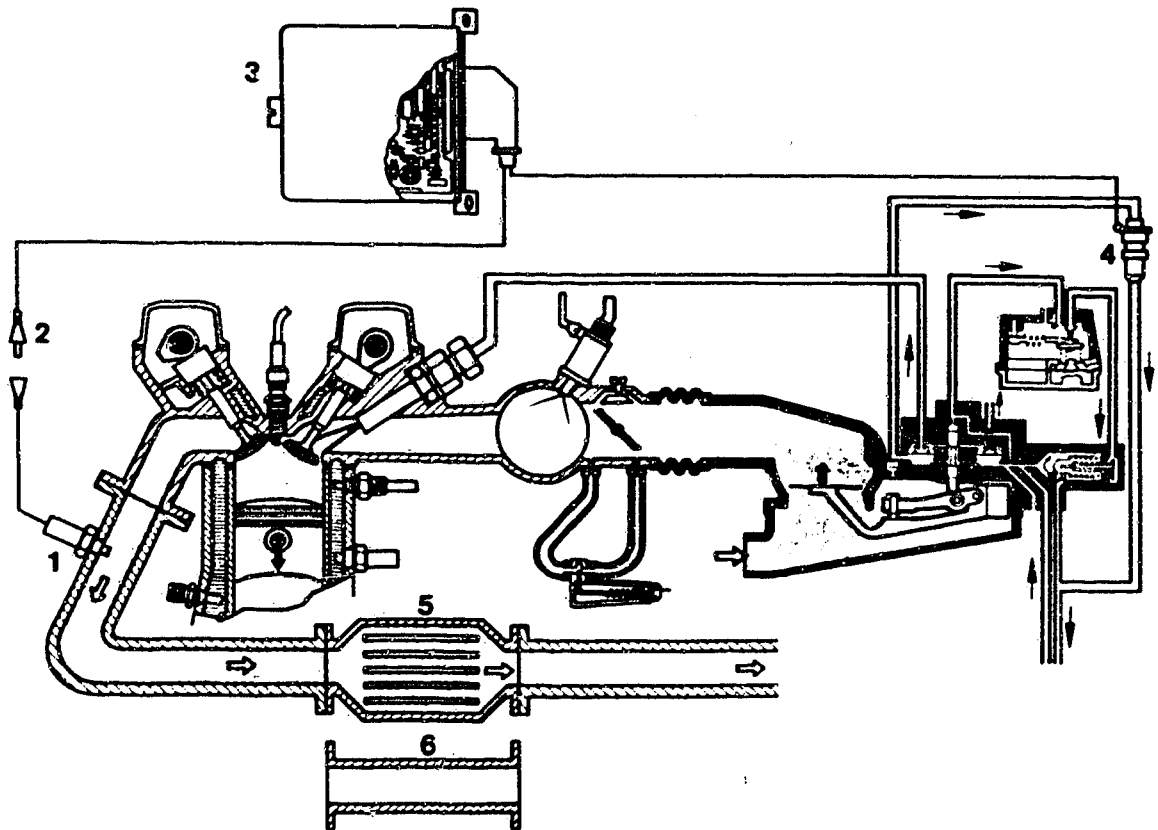
Caution!

If the vehicle is operated on leaded fuel (predominantly in countries without stringent exhaust emission legislation) the catalytic converter must be removed. If not removed, the catalytic converter would become clogged up and lead to a reduction in the power output of the engine.

Appropriate intermediate pipes for converting the exhaust system are available from the vehicle manufacturer.



5. Lambda closed-loop control



1 = Lambda sensor
2 = Plug

3 = Control unit
4 = Timing valve

5 = Catalytic converter
6 = Intermediate pipe

Export vehicles for the USA and Japan are equipped with lambda closed-loop control. This additional function of the K-Jetronic or L-Jetronic is not a downstream emission control system, but ensures a low pollutant content in the exhaust gas by means of optimum mixture preparation. Additional exhaust-gas recirculation, secondary-air induction or secondary-air injection is therefore not necessary in most cases. Like the catalytic converter, the lambda sensor (in the exhaust gas) operates only with unleaded fuel.

If the vehicle is operated on leaded fuel, the lambda sensor becomes clogged up and ceases to operate. The control unit detects this and switches from closed-loop to open-loop control. The system then operates on a fixed air-fuel ratio in the same manner as a K-Jetronic or L-Jetronic without lambda-closed-loop control. Before operating on leaded fuel, the lambda sensor should be removed and the installation hole should be closed off with a screw plug M18x1.5 (length of thread max. 8.5 mm). The disconnected plug (2) of the sensor connecting cable should be insulated and fastened to a suitable place on the vehicle body.

Caution!

Under no circumstances must the control unit or the timing valve be shut down on the lambda closed-loop control of the K-Jetronic.
The catalytic converter should be replaced by an intermediate pipe.

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(KH/VSK)



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